

COAL AGE

Vol. 1

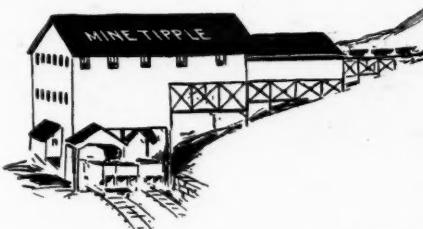
NEW YORK, DECEMBER 23, 1911

No. 11

Supposing two huge boulders were balanced on the side of a steep hill directly above your mine tipple. Imagine, for illustration, you pass that way and perceive how delicate is the balance of the rocks, and how near they are to crashing down on your mine buildings. Let's assume that on investigation you find a jarring force is acting at frequent intervals to displace these boulders, and that the smaller rock is about to be precipitated against the greater mass below.

Would you hurry to your office and, with warning finger raised, say to your subordinates, "Hush! Hush! I've discovered we are in imminent danger from great boulders that are being dislodged by a powerful disturbing force. Stand pat! Don't move! The catastrophe might be averted, but the expense is too great. Similar dangerous rocks threaten the plants of our competitors, and if disaster strikes, we will fare no worse than they"?

Many coal operators (fortunately not all) are following that plan today. They realize the seriousness of



the situation, but hope for
imminency they have not

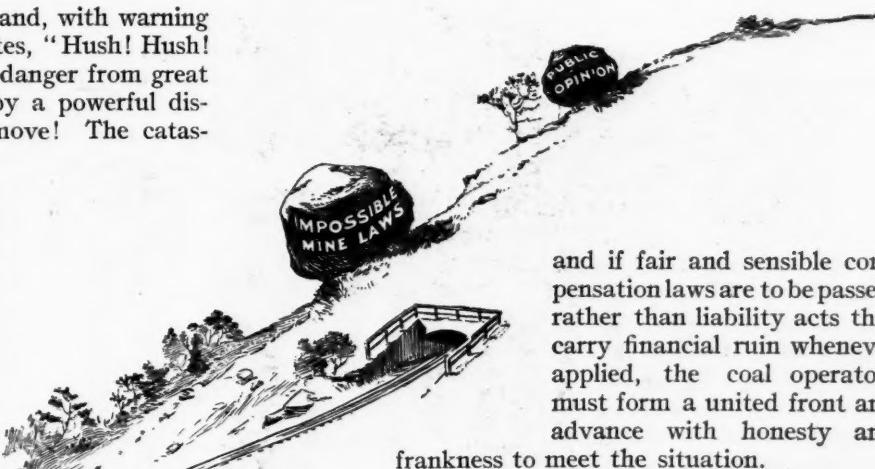
striven to secure. The destructive force, *mine explosions*,

continues to shake the upper rock, *public opinion*, and before long it will be torn from its base, crash into the greater boulder, *impossible mine laws*, and the combined mass will bury coal operators and their financial investments so deep, even their miners won't be able to dig them out.

We all know there has been an advance in technical knowledge in recent years, but how can we say our mines are safe when actual count today shows that disasters are just as frequent and no less serious.

Unless care is exercised, legislation forced by public opinion and enacted by people who are ignorant on the subject of coal mining, will prove a greater burden than the industry can bear.

The operation of a mine includes the assumption of obligations to employees and the public, that are not settled by handing out pay envelopes each fortnight. Efforts are already being made in several states to fix definitely the responsibility of mine owners,



and if fair and sensible compensation laws are to be passed, rather than liability acts that carry financial ruin whenever applied, the coal operators must form a united front and advance with honesty and frankness to meet the situation.

The solution of our urgent problems is plain to all and entails the addition of a small charge to the present cost of mining. One-half cent per ton will more than care for employees' compensation, and another cent or two will largely eliminate the dangers that still prevail.

Each state will have to take care of its own operations, and if the larger producers lead the way, the less important coal states will have to follow or show cause in the court of public opinion. The advantage gained by delay will be short-lived and the profits inadequate. In the end, if the industry can't stand the additional costs, the consumer will have to do so, and he'll not complain if the situation is made clear to him.

The coal industry is in the fortunate position of having everything to gain and nothing to lose by laying its cards on the table face up. The man who doesn't try to get from under before the rocks fall, isn't worth digging for after the avalanche.

Taylor Breaker near Scranton, Penn.

A reënforced-concrete breaker, equipped throughout with electrically driven machinery, has recently been erected at Taylor, Penn., about three miles southwest of Scranton, by the coal-mining department of the Delaware, Lackawanna & Western R.R. Co. A view of this structure, which is really a breaker and washery combined, is given on the front cover of this issue. The building is quite finished and completely equipped, but connection has not been made with the mines, pending the abandonment and removal of the present plant, and the breaker is therefore not yet in operation.

The new plant will be served by two openings, one a shaft located several

By M. A. Walker

The new plant at Taylor is a breaker and washery combined. The building is of reënforced-concrete construction throughout. All machinery will be electrically operated by power supplied at high voltage from a central plant, 3 miles distant.

Compared with the usual 12x12-in. yellow-pine posts of the familiar timber structure of this kind, these columns are apt to seem unduly large, but when it is recalled that concrete, while three times as heavy as timber, has only about one-half the allowable working stress of the latter, the necessity for such large sections is more readily understood, especially when considered in conjunction with the unusually great unsupported length of the columns beneath the Taylor breaker.

A view of the building while under construction is given in Fig. 1. At the time this photograph was taken, concrete work had been completed as far as the

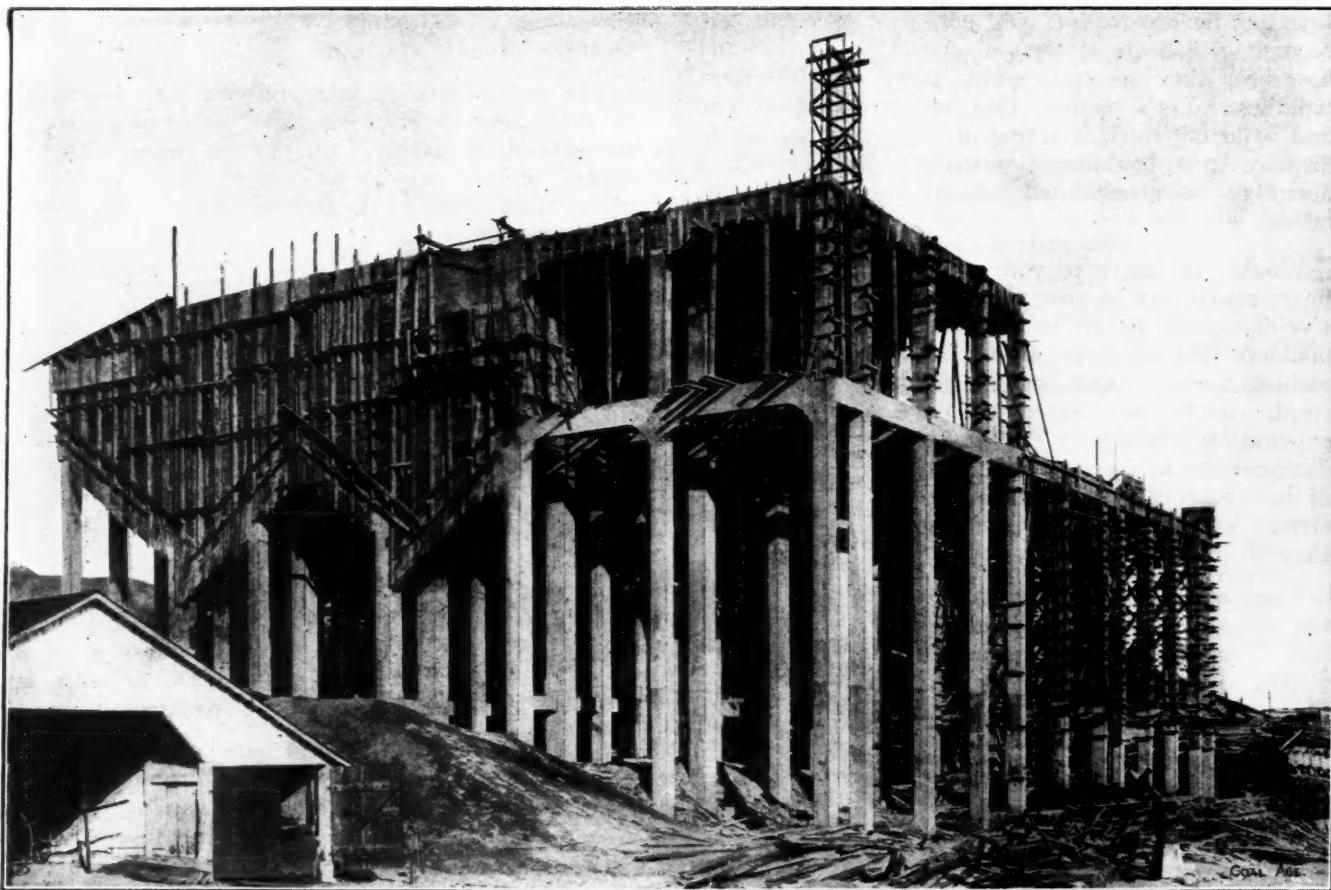


FIG. 1. VIEW DURING CONSTRUCTION, SHOWING FORMS FOR CONCRETE

hundred feet to the rear of the structure as viewed in the illustration, and the other a slope in the Surface vein. Coal from both openings will be discharged into an inclined conveyor, 250 ft. long, which will run from the surface to the head of the breaker. This conveyor will be of the scraper type with 4-ft. flights and Monoblock chain, and will be supported on a steel bridge and trestle rising to a height of about 140 ft. at the head end.

The breaker is a massive structure, extending 107 ft. along the railroad, having a depth of 133 ft. and rising to a

height of 149 ft. above the track level. Beneath it run two railroad tracks where cars will be loaded for shipment, and a wagon road for the accommodation of retail trade. The construction, from foundation to roof, is entirely of reënforced concrete; even the two stairways which give access from the ground to the main floor are concrete monoliths.

When viewed at close range the building gives an impression of great mass and strength. Some of the supporting columns at points of heaviest loading are as much as 38 in. square in section.

top of the loading pockets. Since the structure was finished, the exposed surface of the concrete has been painted with a black pitch-like material known as "Concrete Coating." This acts as a preservative and incidentally does thoroughly and at once what, in all probability, the dust from the breaker would eventually accomplish in any case. A noticeable feature of the construction is the provision made for housing the main elevators. These rise from a depth of 15 or 20 ft. below the ground to the top of the breaker through commodious con-

crete-walled shafts of evident strength and permanence.

The coal beds of the Lackawanna Valley are in general level seams, lying at no great depth below the surface. Such rock as is removed with the coal is usually of a size that admits of its being easily handled, and since, as a rule, little or no difficulty is experienced in unwatering the mines, the coal comes to the surface comparatively clean and dry. The process of preparation does not, therefore, include washing or jiggling of the coal except in connection with the smaller sizes and as a last resort in the case of a portion of the larger material which is beyond the scope of mechanical picking.

The scheme of preparation at the Taylor breaker is briefly as follows: Run-of-mine coal from the main conveyors is discharged onto a bank of three head-screen shakers. Lump and steamboat coal pass off the top screen, grate and egg sizes being made on the other two. The lump and steamboat coal from the top shaker is run into two picking chutes along the sides of which stand a number of men who remove the slate from the coal. The grate and egg sizes are each conducted over two spiral pickers and the stove and smaller sizes passing through the last head screen are led to two banks of mud-coal shakers. The bony coal from the grate and egg head-screen spirals is taken to a set of No. 2 pony rolls and crushed. There thus originate at the head of the breaker three distinct streams of coal which may be identified by the name of the screens over which they are subsequently sized: the main-screen coal, the mud-screen coal and the pony-screen coal.

The main-screen coal comes from the lump and steamboat, which is hand-cleaned at the head of the breaker. After passing through the crusher rolls it is led to a bank of two shakers which make grate and egg size. These sizes are each passed over two sets of Emery pickers and sent to the pockets. The undersize from the main-screen shakers passes to two banks of counter-main-screen shakers where stove, nut and pea coal sizes are made. The stove and nut sizes from these latter each pass over two sets of Emery pickers and thence go to the pockets. The pea coal is not subjected to further mechanical picking. Buckwheat and smaller go to the washery.

As previously noted, there are two banks of mud-coal shaking screens. These make stove, nut and pea sizes. The stove and nut are each passed over two sets of Emery pickers and the pea coal is led over four spiral pickers. The buckwheat and smaller sizes go to the washery.

Coal from the No. 2 pony rolls, together with that brought up by the lip-screen elevators, is handled over two banks of pony-coal shaking screens, which separate grate, egg, stove, nut and

pea sizes. The egg, stove and nut sizes are each passed over two sets of Emery pickers. The pea coal is passed over four spiral pickers and the buckwheat and smaller sizes go to the washery.

The tailings from all the mechanical pickers are collected and elevated to a set of shaking screens at the top of the breaker which separates them into egg, stove and nut-coal sizes. Each of these several sizes is then passed over two sets of Emery pickers and four spiral pickers. The pea coal and smaller sizes from the tailings screens go to the washery. The rock which is removed from the coal during its passage through the breaker is run to a conveyor, which carries it to a pulverizer, and after being crushed is used for silting in the mines.

The washery handles the fine coal and bony coal from the breaker, as previously noted, and also such coal as may be condemned for excess of impurities. All this material is delivered to the washery screens by the main elevators, which have 20x28x15-in. gravity-discharge buckets. One bank of head-screens takes off grate and egg-coal sizes. Two banks of No. 2 screens make stove, nut and pea-coal sizes, and two banks of No. 3 screens make buckwheat, rice and No. 1 and No. 2 barley. The egg and stove-coal sizes are each jigged once. The nut, pea and buckwheat sizes are jigged and then rejigged. There are three sets of rolls in the washery arranged to feed into the main elevators. These rolls are used for breaking down boney coal, of stove, nut and pea-coal sizes, respectively.

Following is given a tabulated statement of machinery in both breaker and washery:

SHAKING SCREENS IN BREAKER

Head screens	
1 lump and steamboat	5×12 ft.
1 grate	6×12 ft.
1 egg	6×12 ft.
Main screens	
1 grate	5×15 ft.
1 egg	6×15 ft.
Counter main screens	
2 stove	5×21 ft.
2 nut	6×21 ft.
2 pea	6×21 ft.
Mud screens	
2 stove	5×18 ft.
2 nut	6×18 ft.
2 pea	6×18 ft.
Pony screens	
2 egg and grate	5×24 ft.
2 stove	5×21 ft.
2 nut	6×21 ft.
2 pea	6×21 ft.
Tailings screens	
1 egg	5×12 ft.
1 stove	6×12 ft.
1 nut	6×12 ft.

SHAKING SCREENS IN WASHERY

Head screens	
1 grate	5×12 ft.
1 egg	6×12 ft.
No. 2 screens	
2 stove	5×21 ft.
2 nut	6×21 ft.
2 pea	6×21 ft.
No. 3 screens	
2 buckwheat	5×30 ft.
2 rice	5×30 ft.
2 No. 1 barley	6×30 ft.
2 No. 2 barley	6×30 ft.

44 total

ROLLS

1 set main crusher rolls No. 1
1 set pony rolls No. 2
1 set egg rebreaker rolls No. 3
1 set stove rebreaker rolls No. 4
1 set nut rebreaker rolls No. 5
1 set pea rebreaker rolls No. 6

6 total

EMERY PICKERS

2 on main-screen grate coal
2 on main-screen egg coal
2 on counter-main-screen stove coal
2 on counter-main-screen nut coal
2 on mud-screen stove coal
2 on mud-screen nut coal
2 on pony-screen egg coal
2 on pony-screen stove coal
2 on pony-screen nut coal
2 on tailings-screen egg coal
2 on tailings-screen stove coal
2 on tailings-screen nut coal

24 total

SPIRAL PICKERS

2 on head-screen grate coal
2 on head-screen egg coal
4 on mud-screen pea coal
4 on pony-screen pea coal
4 on tailings-screen egg coal
4 on tailings-screen stove coal
4 on tailings-screen nut coal

24 total

JIGS

2 on egg coal
2 on stove coal
4 on nut coal
4 on pea coal
4 on buckwheat coal

16 total

ELEVATORS AND CONVEYORS

Main elevators, 20×28×15-in. gravity discharge.	
Bottom lift, 67 ft. 6 in.; top lift, 58 ft. 6 in.	
Lip-screen elevators, 11½×24×18½-in. buckets.	
Bottom lift, 51 ft.; top lift, 65 ft.	
Tailings elevator, 11½×24×18½-in. buckets	
Buckwheat elevators, 11×18½×18-in. buckets	
Rock conveyor.....	10×20-in. flights
Bone conveyor.....	10×20-in. flights
Fine coal conveyor.....	10×20-in. flights
Tailings conveyor.....	10×20-in. flights
Cross conveyor.....	10×20-in. flights
Lip screen conveyor.....	5×12-in. flights

All machinery in the Taylor breaker will be electrically driven. Three-phase alternating current at 2200 volts will be brought from the Lackawanna company's Hampden plant in Scranton to a transformer house on the ground at the rear of the breaker. Three single-phase Westinghouse transformers are installed at this point and will deliver power at 440 volts for the use of the operating motors. These latter are of the Westinghouse squirrel-cage induction type, and are uniformly of 5, 10, 20, 30 or 50 hp. rated capacity. Friction clutches, inserted in the transmission gearing between the motor and the driven machines, provide both a necessary means for starting up under load and a safeguard against overloading, although the motors have a rated capacity considerably above the probable demand.

Following is a list of the motors in both the breaker and the washery sections:

MOTORS IN BREAKER

2—20 h.p. for lip screen elevator
1—20 h.p. for tailings elevator
1—10 h.p. for tailings conveyor
1—10 h.p. for cross conveyor
2—5 h.p. for lip-screen conveyor
1—20 h.p. for head screens
1—20 h.p. for main screens
2—20 h.p. for counter main screens
2—20 h.p. for mud screens
2—30 h.p. for pony screens
1—20 h.p. for tailings
1—30 h.p. for main rolls
1—20 h.p. for pony rolls
1—20 h.p. for No. 3 rolls

MOTORS IN WASHERY

2-30 h.p. for main elevators
1-20 h.p. for buckwheat elevator
1-20 h.p. for rock conveyor
1-20 h.p. for head screens
1-30 h.p. for No. 2 screens
2-30 h.p. for No. 3 screens
2-50 h.p. for 16 jigs
3-20 h.p. for 3 sets of rolls

Wiring conduits were embedded in the concrete at the time of building and the power lines for both motor and lighting circuits are thus in general concealed and protected. An excellent feature of the installation is the main switchboard, centrally located on the principal floor of the breaker. The entire plant can be con-

trolled from this point and incidentally terminals are provided for taking power measurements, so that the power requirements of any machine or group of machines may be determined at any time by merely connecting the meters at this switchboard.

The breaker will be heated throughout by exhaust steam, which will be conducted through a number of radiator coils variously located and distributed throughout the structure. By means of an exhaust fan and metal ducts which

connect with all the screens, rolls, elevators, etc., dust will be collected and eliminated as far as possible from the breaker. This plant was designed by Mr. Samson, superintendent of construction, and H. M. Warren, electrical engineer, under the supervision of R. A. Phillips, general superintendent of the coal-mining department, Delaware, Lackawanna & Western R.R. Co. The reinforced-concrete work was designed and built by the Hennebique Construction Co., of New York City.

Coal Mining Institute of America

Editorial Correspondence

The winter meeting held in Pittsburg developed the most interesting discussions that have occurred before this body in several years. A. W. Calloway elected president.

The winter session of the Coal Mining Institute of America was called to order at 10 a.m., Tuesday, Dec. 19, in the auditorium of the Engineers' Society of Western Pennsylvania, by G. A. Taylor, the president of the institute.

Mr. Taylor refused to accept the presidency for the coming year because of his many other engagements. The election stood between A. W. Calloway, general superintendent Rochester & Pittsburg Coal Co., W. E. Fohl, consulting engineer, and I. G. Roby, state mine inspector. Mr. Roby declined to accept the position, and the choice of the institute fell on Mr. Calloway. J. K. Johnston, W. E. Fohl and Elias Phillips were elected vice-presidents. C. L. Fay was unanimously reelected secretary-treasurer. Jas. Scurfield, Nicholas Evans, S. A. Taylor and Austin King were elected additional members of the executive board.

E. W. Parker, coal statistician of the U. S. Geol. Sur., spoke on his work in collecting figures relating to the coal industry. He remarked that it was an open question whether more coal had been produced in 1911 than in 1910.

The afternoon session was devoted to discussion, with Thomas K. Adams, mine inspector, in the chair. The first discussion was on the Employers' Liability Act vs. the Workmen's Compensation Act. Sion B. Smith, who has made a study of the subject in all its aspects, pointed out that the present liability provisions cast an uncertain burden on the operator. He stated that the mine owner did not know what he might be compelled to pay, and so long as such conditions exist, the operation of a small coal mine is in the nature of a gamble. An accident might load the owners of any mine with a crushing burden which might drive them out of business. The large operators could face the possibilities with more equanimity because of the multiplicity of their interests.

EMPLOYMENT OF BOYS IN MINES

In answer to the question, "Is the act of June 15, 1911, regarding the employment of boys, advisable?" it was pointed

out that boys could work outside the mines from 14 years of age upward, but in the mine the limit stood at 16 years. This was regarded by Mr. Cunningham as a restriction of the rights of the mining industry, tending to deplete it of its most promising material. The boy would enter some other form of employment at the formative age of 14 years, and later continue at his newly found line of work. It would not keep him any longer at school than till such time as he arrived at 14 years of age. After that, as he could not work in the mine, he would drift into some other industry or into unfortunate pursuits.

Mr. Crane admitted that certain forms of outside work were more desirable than mine work, but advocated the restriction preventing boys from entering the mines till 16 years of age.

It seemed, however, to be the general opinion that the period of exclusion between 14 and 16 years would not promote education, but would deplete the mining industry of native labor, which labor would be performed by foreigners, who need education to fit them for the work.

FALLS OF ROOF

"How can the number of accidents from falls of roof be reduced?" was then discussed. Mr. Roby advocated the employment of rib-bosses, whose authority should be exercised over about 40 men, if all these men were working along one line of fracture. He thought one man could not control as many men if they were scattered at widely separated points, so that the bosses would have far to travel.

He urged that the assistant bosses should report to the mine foreman the names of all miners who are not properly posting the roof. Discipline was emphasized. Mr. Fay suggested that "the man higher up" should insist on discipline, and he felt that then a sense of its importance would filter down. Mr. Affelder said he knew of one operator who enforced the law rigidly relative to the prohibition of all men, but the motorman and brakeman, from riding on the motor. He said the superintendent had been ordered off the motor by the motorman, but that motorman finally failed in obeying instructions and permitted one man to ride—the mine inspector.

Mr. Hall recommended the Summary Jurisdiction Act of Great Britain to the attention of those present, urging that the justice of the peace should be empowered to adjudicate the smaller breaches of discipline. The Court of Quarter Session met too seldom; the cost of conducting a case before it was too costly and took too much of the inspector's time so that he frequently let offenses pass uncorrected to save the time needed for more considerable matters. He also called attention to the difficulty in subpoenaing witnesses, many of them foreigners who would decamp rather than appear in court.

Mr. Taylor said that such a law would fail, owing to the fact that the justice of the peace was elected and therefore subject to the overpowering vote of the miners in small mining towns. It seemed, however, the general consensus of opinion that discipline by suspension and discharge was preferable, and, at least in nonunion mines, was possible.

Jesse K. Johnston said that a prevalent cause for lack of discipline was the practice of the labor unions, these bodies assuming the miner was persecuted, not prosecuted. These unions were ready to pay not only attorney's fees, but the fines imposed on offenders.

[A further account of the meeting with more discussion will be published next week. Mr. Burrell's interesting paper on "Mine Gases" is printed on p. 348 of this issue of COAL AGE.—EDITOR.]

Retort Oven Plant at Gary, Ind.

The largest and best equipped coal-handling and byproduct coking plant in the world is at Gary, Ind. It is of special interest because electrically operated by motors receiving their current from the gas-power plant of the largest steel plant on earth.

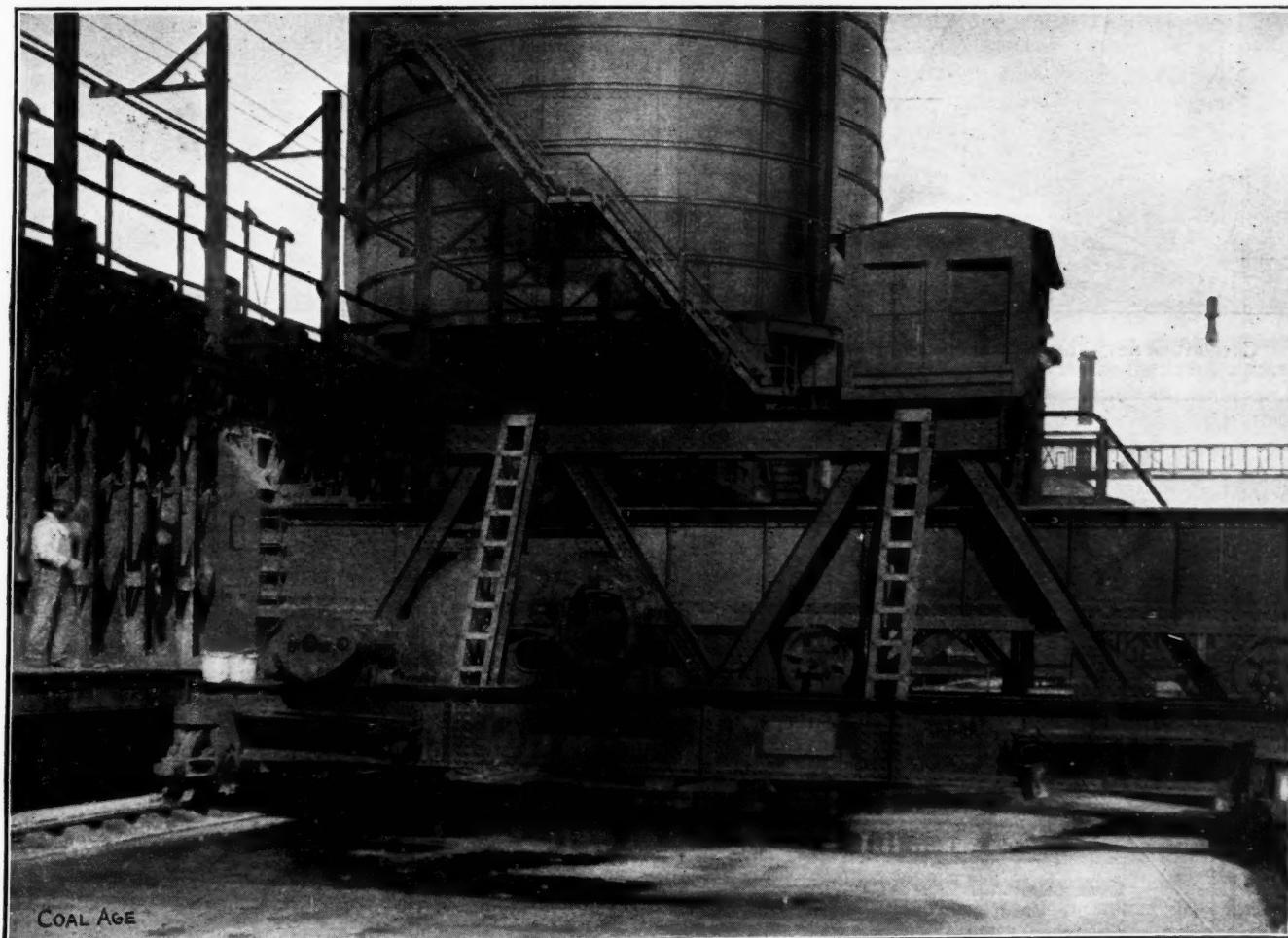
Another claim to distinction lies in the use of 560 Koppers' Regenerative By-product coke ovens, with a total coke capacity of 8000 tons per 24 hours, and Koppers' Modern Direct Process for recovering ammonia from the gas in the form of ammonium sulphate. This is the first coke-oven plant in this country installed with the Direct Process for ammonia recovery.

Special Correspondence

A description of one of the largest and best equipped coal-handling and by-product plants in the world. Electricity generated with producer gas is used throughout. Capacity of plant when completed will be 9520 tons of coke per 24 hours.

The bridges are each equipped with 7-ton buckets and can load twenty 50-ton larry cars per hour. Their closing and opening lines and trolley travel are each operated by a 150-hp. General Electric, type MI motor and the two bridge trucks are operated by eight 30-hp. motors of the same type.

Coal, after being loaded into a transfer car, is dumped into one of 12 hoppers at the unloading house. These hoppers are each equipped with a shaker distributor driven by a 15-hp., General Electric, three-phase, squirrel-cage, induction motor. Each of the shakers can evenly distribute 40 tons of coal per hour on the belt conveyors. A continuous supply of coal is



COAL AGE

MOTOR-OPERATED TRAVELING COKE-PUSHER

COAL HANDLING

Let us follow the coal from its arrival at the immense storage yard, thence to the breaking and crushing building, on to the mixer building and finally to the coke ovens. We will then follow the coke from the ovens until it is quenched and ready for the blast furnaces; also trace the course of the coke-oven gases through the byproduct house until, freed of tar and ammonia, they are ready for

use in the coke ovens and in the soaking pits of the steel plant near-by.

Coal for coke making is dumped from railroad cars into a concrete storage yard which has a capacity of 350,000 tons. The walls of this yard are inclined under the railroad tracks to deflect the coal away from the sides of the yard so the grab buckets of two large Wellman-Seaver-Morgan coal bridges can easily reach it.

assured by keeping one hopper full at all times.

The coal is carried from the unloading house by four belt conveyors, each of which has a capacity of 500 tons per hour. They are driven by four 30-hp., three-phase, Form K, General Electric, induction motors which, together with those used to operate the Bradford breakers, hammer-mill crushers and intermediate conveyors, are controlled by a special

electrical interlocking system. The stopping of any conveyor or machine automatically holds up all operations prior to its own, thereby preventing waste or jamming.

PREPARING THE COAL

The unloading-house conveyors carry the coal to Bradford breakers, each of which has a capacity of 500 tons per hour. It is here broken to 1-in. mesh and separated from what little slate, stone, wood, iron, etc., it may contain. Power for this operation is furnished by four 75-hp., three-phase, General Electric motors.

tors used here are in a separate room built on the side of the house. In many other cases, however, conveyor motors, located near conveyors in other buildings, are showered with coal dust.

Crushed coal is carried from the crusher house to the mixer building by two conveyors, each of which has a capacity of 500 tons per hour. They are 120 ft. long, travel 580 ft. per minute and are housed over to insure protection against the elements. In the mixer house are two 500-ton mixers run by two 15-hp., Form K, General Electric, induction motors with automatic control.

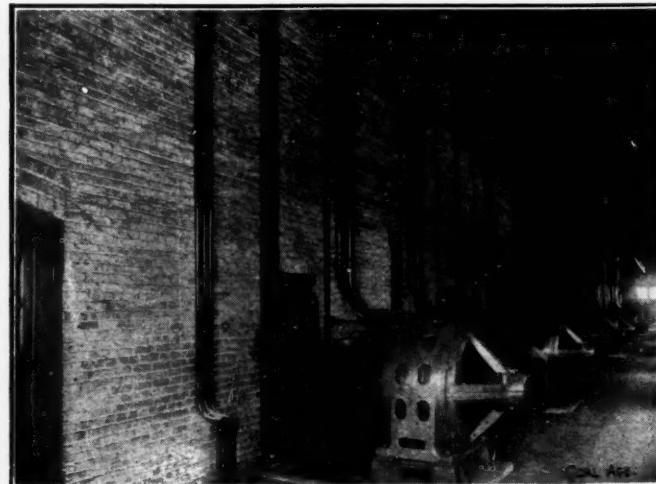
coke-oven batteries. These bins have a capacity of 2100 tons each and the six conveyors will completely fill them every 10 hours. The conveyors are driven by two 100-hp., two 75-hp. and two 30-hp., three-phase, Form K, General Electric, induction motors. It is unnecessary to run the coal-handling plant at night due to its capacity and that of the storage bins.

COKE MAKING

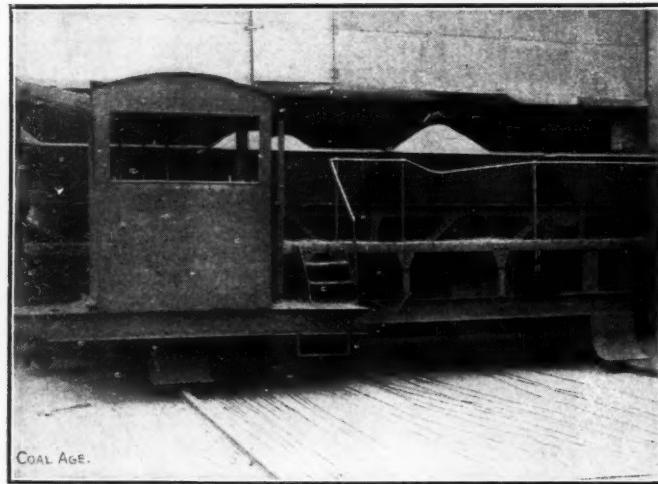
Larry cars run under the storage bins and over the tops of the coke ovens, into each of which they charge 12½ tons of



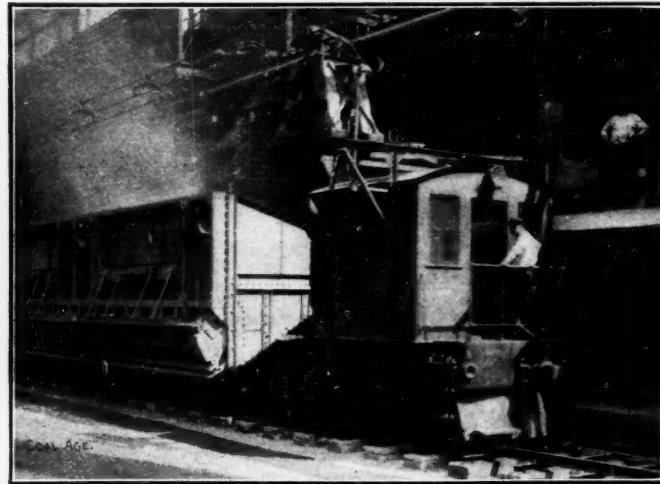
CONVEYORS BETWEEN BREAKERS AND HAMMER MILLS



TWO SQUIRREL-CAGE MOTORS DRIVING HAMMER MILLS



COAL-CHARGING LARRY CAR



COKE CARS AND LOCOMOTIVE

Between the breakers and the next operation, crushing the coal in hammer-mill crushers so that 85 per cent. of it will pass through a No. 64 wire-mesh screen, are four conveyors. Each of these has a capacity of 500 tons per hour and they are driven by four 30-hp., three-phase, General Electric, induction motors. The eight hammer-mill crushers, with a capacity of 350 tons per hour, are driven by 250-hp., three-phase, Form K, General Electric, induction motors.

As the coal-crushing house is thick with coal dust floating in the air, all mo-

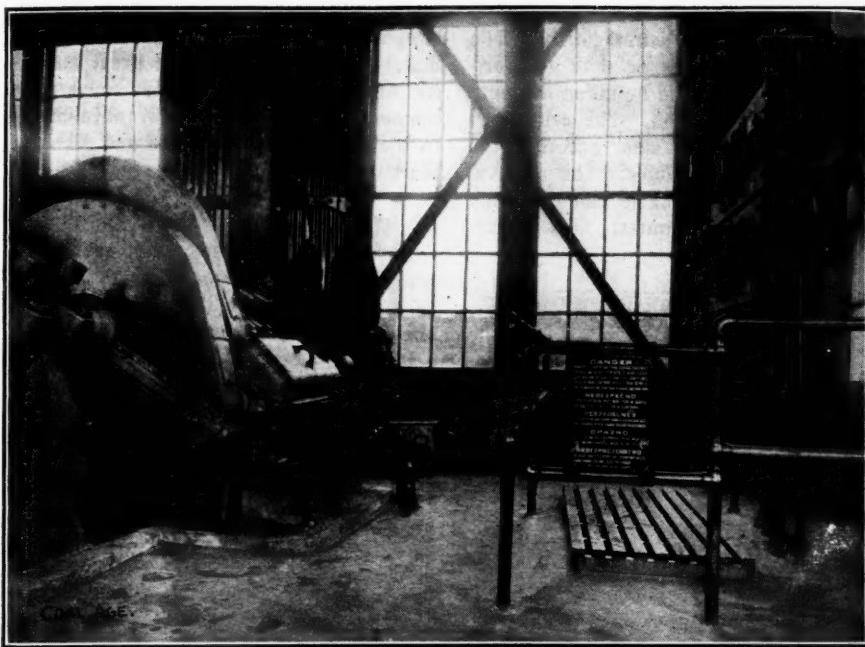
The unloading, breaking and crushing machinery and the mixer are connected by an electric signal system which indicates by electrically operated air whistles, any change in character or mixture of coal being sent through.

The mixer building has a storage capacity of 2000 tons of pulverized coal. In it, 80 per cent. Pocahontas and 20 per cent. Ronco coal are mixed, which gives a coke yield of 84 per cent. of the coal charged. From the mixer house six 500-ton conveyors carry the crushed coal to four cylindrical storage bins over the

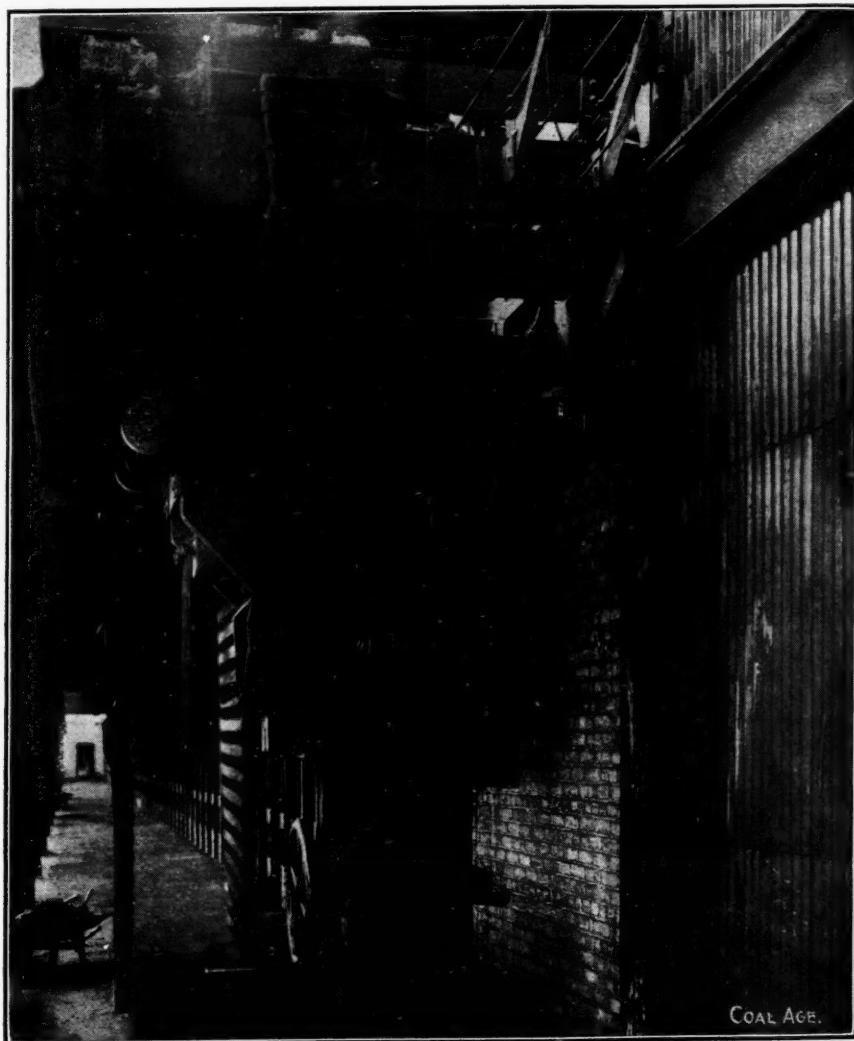
coal. The coal is then leveled by a traveling leveler which is operated by four 30-hp., General Electric motors. Charging is carried on in a certain prescribed sequence and there are always ovens ready for pushing, thus assuring continuous operation of men and equipment.

Coking requires 18 hours, at which rate the present capacity of the plant is 8000 tons per day; when entirely completed the total capacity will be 9520 tons.

The advantages of the type of oven selected for the Gary plant are interesting.



MOTORS AND AUTOMATIC-CONTROL EQUIPMENT OPERATING QUENCHED-COKE HOISTS



COAL AGE.

TRAVELING DOOR-EXTRACTOR DRIVEN BY A 7-H.P. MOTOR AND LOCATED ON DISCHARGE SIDE OF COKE OVENS

The ovens are heated with gas evolved from the coal carbonized. The coal yields from 50 to 60 per cent. more gas than necessary for its carbonization, and in the old beehive process this surplus gas is wasted.

A further advantage is that it is not essential that the gas be consumed on the spot directly it is produced, since it can be conveyed any distance without material loss. It can also be stored during the time it is not required and consumed during the working hours of the day.

The regenerators also serve as a storage for heat so that a whole battery of ovens can be shut down entirely for a week or so and started again without any heating up being necessary. This is not possible where regenerators are not used. The regenerators enable the ovens to be worked at less than one-quarter capacity without going cold, whereas most other systems cannot be worked much below their normal capacity without cooling down.

DESCRIPTION OF OVENS

The oven chambers are approximately 39 ft. long, 9 ft. 10 $\frac{1}{2}$ in. high and from 17 to 21 in. wide. They have doors at either end, operated by a traveling door machine on the coke-discharge side, and a door machine attached to the coke pusher, at the other side. The top of the oven is provided with openings for charging the coal and an opening through which the gases of distillation are drawn off to the condensing plant.

Referring to the accompanying longitudinal section, the air for combustion flows along the passageways *A*, at the front and back of the ovens, and thence it passes into the regenerators through the inlets *B*. In the regenerators, the temperature of the air rises to 1200° C. (2190° F.). The highly heated air then passes out of the regenerators into the vertical heating flues through the openings *C*. The gas from the byproduct plant, freed from tar and ammonia, is returned to the ovens by the mains *D*, running along the whole length of the ovens on each side. Branch supply pipes *H* conduct the gas into the gas-distributing channels *E*, which are situated directly beneath the oven walls; thence it passes through the gas nozzles *F*, into each vertical flue, where it ignites with the hot air entering through the passage *G*, previously referred to. A jet is, therefore, formed on a level with the oven floor in each of the heating flues in the oven walls.

The employment of regenerators renders it necessary to reverse the heating process after a certain period of time, usually about 30 min. This is done automatically by a General Electric motor-operated dial switch system, which controls the gas and air valves. The system of heating flues is divided into two sections, so that combustion can take place

alternately in each half of the oven wall. When the gas is burning in the flues in one half of the length of the wall, the products of combustion pass up the flues and enter the top horizontal flue *G*, whence they make their way down the flues in the other half of the oven wall; they then enter the regenerator through the same passages *C*, by which the air is

examining the flues, it is not possible to work retort ovens satisfactorily. The gas nozzles are furnished with oval orifices, to enable them to be taken out with a rod having a tee-end. The orifices in the nozzles vary in size, according to their position in the flues. The removal and replacing of a nozzle can be easily effected in a few minutes.

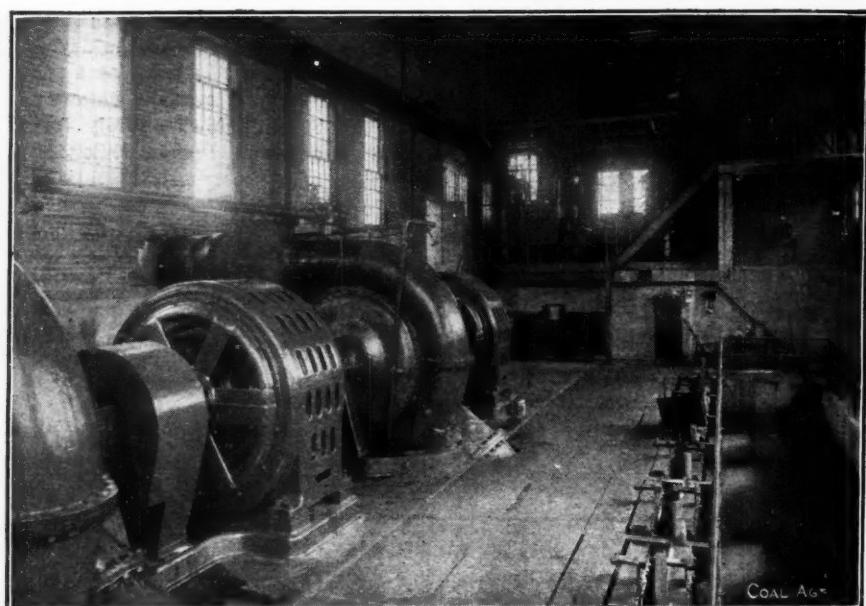
in the Koppers' ovens, the cause of any irregularity in the heating can be immediately detected and, in the great majority of cases, easily rectified in a few moments. The effect of any adjustment in the regulation of the gas and air can, moreover, be immediately seen.

METHOD OF OPERATING

It will have been seen that each oven wall is formed of about 30 vertical flues; each of these flues is provided with a heating jet, and also with means for regulating the admission of the gas and air, viz., by substituting the gas nozzles, and by adjusting the sliding bricks over each flue, respectively. It is, therefore, obvious, that it is a simple matter to control the heating so that the oven walls will be subjected to exactly the same temperature from end to end. This uniformity in the heating, characteristic of the Koppers' ovens, has been sought by coke-oven builders for many years, and unless it be attained, it is impossible to produce a coke which will be homogeneous in character throughout the charge.

When coking is complete, and the gas fully given off, the doors are removed and the charge is pushed out by the traveling ram, which is operated by two 50-hp. and one 7-hp. (the latter on the door opener) General Electric motors.

While being pushed, the coke is partly quenched by water sprinklers, as it falls into a steel and cast-iron car, to which is



INTERIOR OF PUMP HOUSE

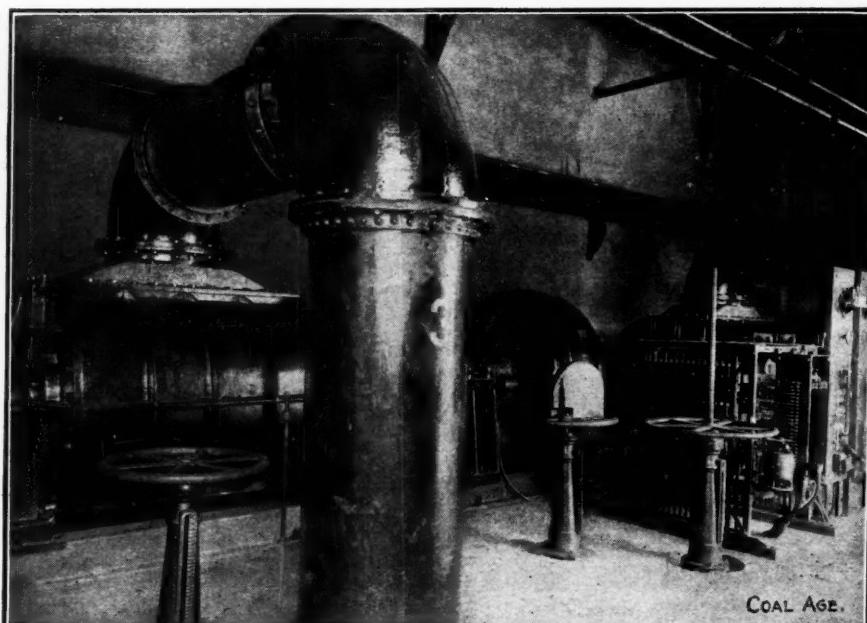
admitted to the flues when the direction of combustion is reversed. On issuing from the regenerator, the waste gases pass into the flue leading to the chimney *I*, after having given up their heat to the checkerwork of firebrick.

ACCESSIBILITY OF OVENS

The products of combustion of the gas and air pass up the heating flues *J*, and through the openings *K*, at the top of each flue. These openings are furnished with dampers *L*, which, together with dampers in the regenerating passages, are easily regulated so as to enable the exact amount of air to enter the flue necessary to effect perfect combustion. The sliding bricks are accessible from the top of the ovens through the openings *M* and *N*, which are fitted with easily removable plugs.

At this point, particular attention is invited to the sliding bricks and to the openings at the top of the ovens, which give ready access to the interiors. These are two of the principal features of these ovens, and distinguish them from all other constructions. The openings at the top of the ovens serve not only to provide means for regulating the dampers, but more particularly to give access to the gas nozzles *F*, and they further permit of the flues being inspected at any time.

Without the facility thus provided for



GAS EXHAUSTERS OPERATED BY 250-HP. MOTORS

It happens from time to time in all ovens that dark places appear in the oven walls, indicating that the combustion is defective; in the absence of means of access to the flues, it would be necessary to cool down the oven and break into the walls in order to remedy the defect. By means of the openings over each flue

attached a three-phase, General Electric locomotive, equipped with two 50-hp. type MI motors. As soon as a charge is entirely in the car, it is rushed to the shower hood, where quenching is completed. The coke is then elevated to storage bins by two automatically controlled, 30-hp. General Electric, three-

phase, form K motors, operating elevators. In the final process, the coke is run through screens operated by two 30-hp. motors of the same type.

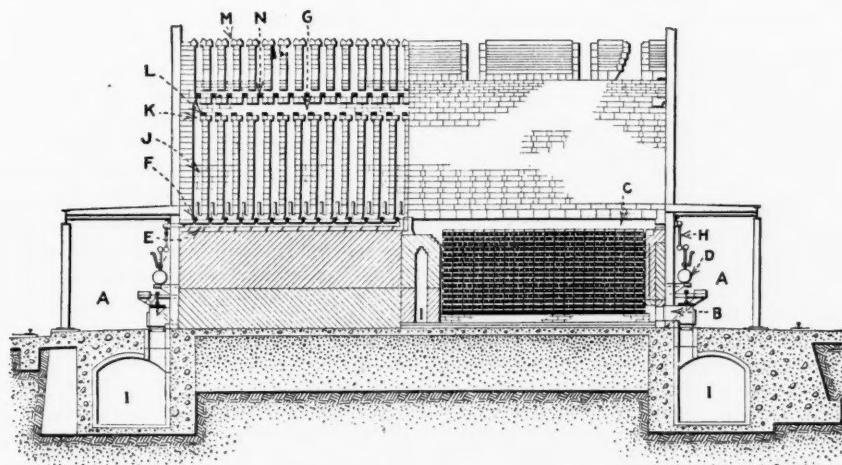
Each two batteries of ovens are equipped with grinding pans and clay elevators for preparing luting material for the oven

type. After passing around the tubes, they leave at a temperature of about 30° C. The gas is then drawn by exhausters, which are driven by 250-hp., General Electric, induction motors, controlled to give a constant gas suction, and delivered to the tar extractors. The

raised to about 70°C. by the use of steam. The heated gas is then conducted to the acid saturators (lead-lined vessels, containing a solution of about 5 per cent. of free sulphuric acid), and the gas leaves the saturators at about 30° C. At this low temperature the chemical affinity between the acid and ammonia is so great that a neutral salt (ammonium sulphate) is easily obtained. The salt is continuously removed from this inclosed type of saturator by an ejector and delivered onto a draining table. From here it is run off, together with the mother liquor, into a centrifugal drier in the usual way. When desired, concentrated ammonia liquor is produced instead of ammonium sulphate.

About 50 per cent. of the total daily yield of about 100,000,000 cu.ft. of gas is used at the steel plant, and the remainder is used to heat the coke ovens. The ammoniacal liquor is treated with lime, to decompose fixed ammonia compounds, and then heated to vaporize the ammonia, which is conducted to the gas main and absorbed in the saturators. About 1 per cent. ammonium sulphate and 2 per cent. of tar is obtained. The coke yield is approximately 84 per cent. of the weight of the coal coked.

This greatest of all coke plants is supplied with 60,000,000 gal. of water a day by two centrifugal pumps, operated by 1300 hp., three-phase, form M, General Electric motors.



LONGITUDINAL SECTION THROUGH A SINGLE OVEN

doors. These are operated by 15-hp., three-phase, form K, induction motors.

BYPRODUCTS

The gases from the ovens go through divided water-sealed mains, thence to coolers of the multitubular water-tube

tar and ammoniacal liquor, which condense here, are run off along with the condensation from the coolers, and separated by gravity in the tar-separating tank.

From the tar extractors, the gas passes to reheaters, where its temperature is

Stearns Mines in Kentucky

By J. E. Butler*

The Stearns mines have an up-to-date electric equipment and an aerial tramway.

*General manager, Stearns Coal & Lumber Co., Stearns, Ky.

Note—Paper read before Kentucky Mining Institute, Lexington, Ky., Dec. 11, 1911.

the railroad intersects the beds successively.

ALTERNATING CURRENT AND SAWDUST FUEL

The first mine was opened in 1902; since then five more have been put in operation with a present production of 2000 tons daily.

For the purpose of furnishing current to the mines, a central power station was erected at the sawmill located at Stearns. This enabled the mining company to use sawdust as fuel. The plant consists of two Wickes vertical water-tube boilers of 400 hp., twin Buckeye engines, each of 400 hp., directly connected to a 450-kw. 40-cycle three-phase General Electric alternating-current generator.

The current is stepped up to 13,000 volts for the high-tension transmission line which delivers current to the substations at the mines, where it is again transformed to 575 volts. This is used for driving the fans, pumps, air compressor and direct-current generators. These generators furnish current for motor haulage and the chain coal cutters.

Incidentally, it may be mentioned in this connection that this plant has proved inadequate to supply the rapidly growing business and the company is even now planning to erect a new and larger plant at Yamacraw of a capacity not less than 1000 hp. Several types of installations are being figured on, among them a high-pressure steam turbine or a gas engine, using either producer or byproduct gas. As a counter proposition, a low-pressure turbine is being considered to use the exhaust steam from the present plant at Stearns. It has been determined that 500 hp. may be secured in this way.

MOTOR HAULAGE

Among the developments of the past year, the installation of motor haulage on the main entries of mine No. 4 must be considered. The coal is gathered from the room partings by mules and delivered

The coal seams, three in number, are the lowest in the series and are designated locally as Nos. 1, 2 and 3. Only the lower two are being developed. Each is between 4 and 5 ft. in thickness. The coal became commercially accessible by the construction of the Kentucky & Tennessee Ry., which extends from Stearns westward through the property. The coal lies at tipple height above the railroad track. This is not due to chance, but in planning the railroad it was arranged that the elevation of the main line should be approximately 30 ft. below that of the beds where it was convenient to open mines. As it drops down the valley of the South Fork River

to sidings on the main entries, where it is picked up in trips of good length and taken to the tipple. Previous to introducing the motors every effort, consistent with economy, was made to reduce gradients to a minimum and to ease curves and straighten roads. The track was then relaid with 25- or 35-lb. steel on white-oak ties, 5x6x5½ in., spaced with 18-in. centers. The compressed terminal bond, consisting of a head on the end of a copper conductor, is used. The head is compressed into a drillhole in the rail by means of a screwjack, which exerts a pressure of from 10 to 20 tons on the head of the bond, causing the copper to expand in the hole and form an intimate contact. These bonds have thus far eliminated the troubles arising from poor contacts. The trolley wire is 0000 V-grooved; the machine wire is No. 4; the clamps are of the "sure-grip" type. On the outside hauls the trolley is strung on 8-in. round chestnut poles set 30 ft. apart with 3x5-in. white-oak crossarms. Power is obtained from a Jeffrey 150-kw. motor-generator set. Three haulage motors are used, one 8-ton and two 5-ton, all Jeffrey equipment. The plant, while small and compact, is installed in a substantial manner and has to date reached all expectations.

AERIAL TRAMWAY

Within the current year a new mine, designated as No. 11, was opened at Yamacraw on the west bank of the South Fork River. As the railroad is on the east bank, it became necessary to provide means for getting the coal across the river temporarily for the development work and later for permanent operation.

For the preliminary work, an old steam log-loading machine was set up near the railroad. A 1¼-in. plow-steel cable was strung over the river and on this was suspended, from a trolley, a bucket of two tons capacity. The coal was dumped from the mine car, through a short chute, directly into the bucket, pulled across the river, dropped into railway cars and shipped as run-of-mine. With this equipment a capacity of 150 tons in 9 hours was obtained at a cost not to exceed 10c. per ton and the wasteful practice of stocking the development coal in the mineyard avoided.

When the permanent equipment was ready for use on Nov. 1 this year, over 2000 ft. of entry and aircourse and 40 rooms were ready for the miners.

The permanent equipment consists of a Broderick & Bascom reciprocating aerial tramway of 550 ft. clear span, operated by a 35-hp. General Electric, variable-speed motor, geared to the main-driving wheel of the tramway. The 1¾-in. lock-coil track cables reach from cliff to cliff across the river and are anchored in solid rock and concrete. The traction cables are 5/8-in. plow steel. The buck-

ets are of 52-cu.ft. capacity and travel at a speed of 800 ft. per minute.

TIPPLE FACILITIES

On coming from the mines the coal is dumped from the mine cars over a Phillips automatic kick-back tip onto the ridge of a 60-ton bin built in the shape of the letter "W." The buckets are alternately loaded through undercut gates at the bottom of the bin. At the tipple the bucket doors are automatically tripped and the coal discharges onto shaker screens of the suspended type, designed to separate four sizes of coal at any given time, but several combinations of sizes may be obtained by the opening and closing of valves in the main pan. This may be done without stopping the screen. The shaker shaft is driven at 120 r.p.m. by means of a 12-hp. induction-motor belt.

The present capacity of the tramway, which is operated by one man, is 500 tons in 9 hours and it consumes 20 to 28 hp. By increasing the size of the buckets and their speed, they may be made to handle 1000 tons daily.

The arrangement of the mineyard may be of interest. The horns of the tipple

are of construction. A railroad yard of like capacity is being graded.

The forms of the new tipple are being built and the reinforcing steel placed. The concrete will be poured continuously, making a monolithic structure. The screens are constructed under the supervision of the Associated Engineering Co., of Louisville.

The tipple will be equipped with double automatic kick-back dumps and the empty cars will return to the mines on either side of the main entry over a 1½ per cent. downgrade. Likewise, the loads will run by gravity from any point 1500 ft. back from the mouth of the mine over a 1½ per cent. grade. The tipple horns are but 75 ft. from the mine mouth and loads and empties at the tipple will stand under cover. At this mine an 8-ft. Jeffrey disk fan, designed for low pressures, has been installed. It is driven by a 12-hp. induction motor. It delivers 35,000 cu.ft. of air per min. at a 0.2-in. water gage. The other mines are similarly ventilated.

Within the near future, work will be started on a central tipple of 1500 tons capacity at mine No. 4. The tonnage of that mine will be increased by that from



CONCRETE FORM FOR NEW TIPPLE AT STEARNS MINE NO. 10

are exactly 100 ft. from the mine mouth. On this account it was necessary to extend sidings into the mines. Gradients are so arranged as to provide 200 ft. of 1½ per cent. in favor of the loads and a corresponding 200 ft. of 1½ per cent. in favor of the empties, which return to the mine through a second entry. With such favorable grades, with cars having roller-bearing wheels and with the aid of the automatic tip, one man has weighed and tipped alone 331 tons of coal in 9 hours.

NEW CONCRETE TIPPLE

In order to double tonnage and shorten the hauls at mine No. 10, new openings are being made and a concrete tipple equipped with shaker screens is in course

of several openings on the opposite side of the river and the coal will be transferred over an aerial tramway similar to that at mine No. 11, but this bucket train will be designed for a greater capacity, or else a wire bridge will be erected to span the valley, by which cars will be brought across the river. As it will be necessary to provide means for employees to cross to their work, a combination foot bridge and car haul will probably be constructed.

This year's developments have called for the construction of 60 dwellings, which brings the total up to 350. Work of this character will be continued until a tonnage of 5000 tons is ultimately reached, but 3000 tons per day is expected in a short time.

The Briceville Mine Explosion

A severe explosion, probably resulting in the death of 84 men, occurred in Cross Mountain mine No. 1 on Dec. 9, at 7:20 a.m. The mine was operated by the Knoxville Iron Co. of Knoxville, Tenn.

Thirty-nine miles north of Knoxville by the Southern R.R. in the County of Anderson, which is in the eastern part of the State of Tennessee, is a small town by the name of Coal Creek, named from a stream of no importance which empties its waters into the Clinch River. At this town the Southern R.R. (Knoxville & Jellico division) puts out a spur to the mines around Fraterville and Briceville, the roadway following

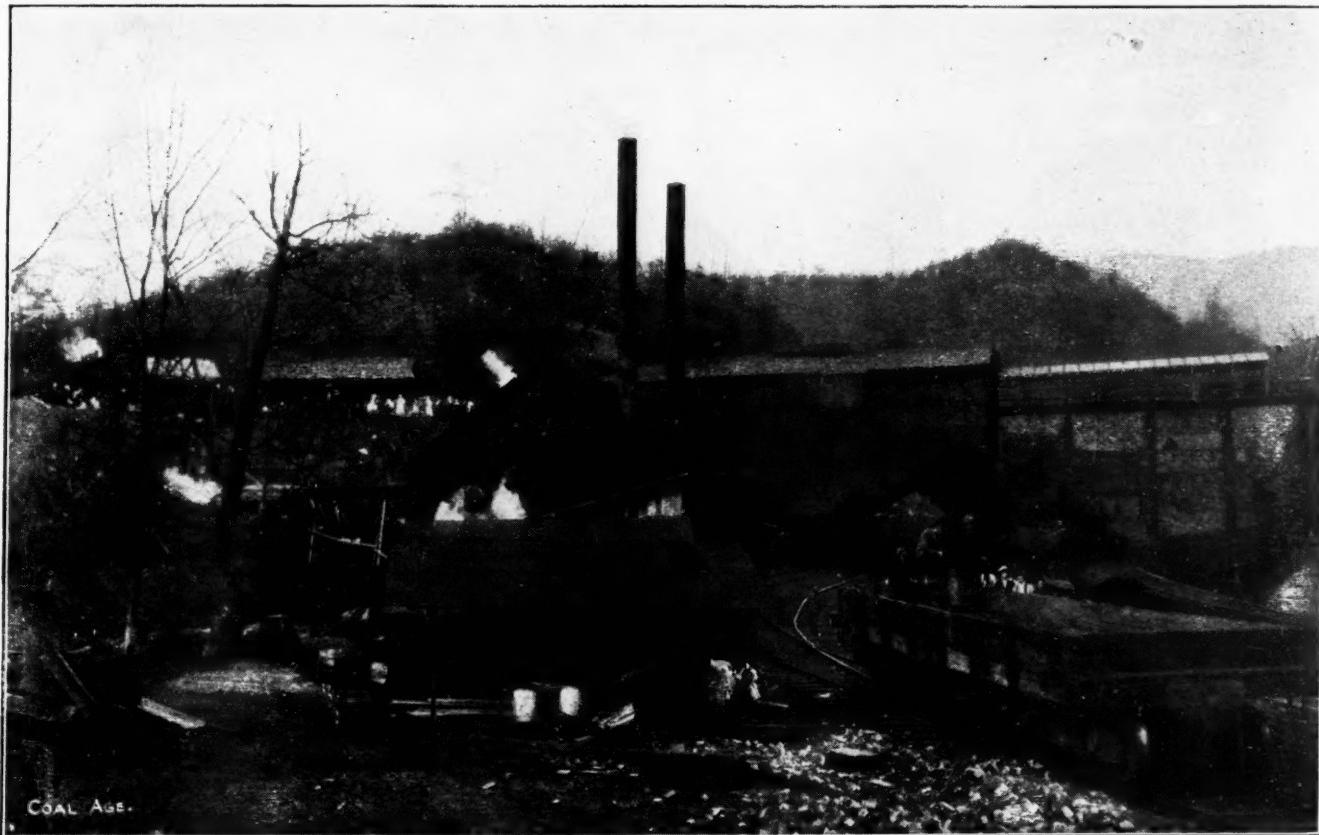
By R. Dawson Hall

A gas explosion in an open-light mine develops great force from the presence of much dry coal dust. Cars in use have no front gates and spill coal freely on roadways. Moistening of entries by watercar method. Fan set at foot of shaft.

and Briceville is therefore almost at the very edge of the coal field. The village of Coal Creek is also at its extreme margin.

Northwestward of Briceville the lower coal measures stretch almost uninterrupted. Only in the bottom of the New River valleys is some of the Briceville shale measure exposed. This shale formation contains the bed mined at Briceville, Coal Creek and Olive Springs.

The Wartburg sandstone lies above this formation. This sandstone, which is, in a less degree, coal-bearing, is, of course, more frequently exposed by the New River tributaries than is the Briceville shale.



TIPPLE OF KNOXVILLE IRON CO. MINE, BRICEVILLE, ANDERSON COUNTY, TENN.

the general south-southwesterly direction of Coal Creek.

GEOLOGY OF SECTION

The geology of the Briceville region is interesting. Barely $\frac{1}{4}$ mile southeastward from that village, the measures have risen in such a steep anticline that, centuries ago, the coal strata were completely eroded, but while the erosion was severe, the anticline is still emphasized topographically by the Walden ridge. The hardness of the Lee Conglomerate, combined with the uplift of the measures, has prevented its erosion to the general level of the Clinch River valley.

A mile from Briceville, also southeast, the violence of the folding proved too much for the measures to withstand and a fault resulted so that the highest formation of the Silurian—the Rockwood—abuts on the second Silurian formation known as the Chickamauga limestone. In another mile another branch of the same fault occurs from the same cause. This time the limestone referred to is found to lie side by side with the Rome sandstone, a Cambrian formation normally about $\frac{3}{4}$ of a mile vertically below it. The two branches of the fault ultimately come together further north. Southeastward there is no coal

FIREDAMP PRESENT

It might be expected that the measures of the Briceville shale outcropping for miles along Coal Creek and Poplar Creek, would be free of gas. But so large are the undrained reservoirs of gas to the northwest that some gas is found in nearly all the mines near Briceville. Northwestward from that town is the Cross Mountain, 2350 ft. above the water level of Coal Creek, perhaps 2300 ft. above the mine I purpose to describe.

Everyone seems to agree that gas, in quantity enough to start an explosion, has been found in Cross Mountain mine

where the recent explosion took place. As early as Apr. 20, 1897, to give a concrete instance, should such be needed, the inspector in his regular round of duties found "gas at the head of the entries, on the right main entry and the inside heading of the manway." But that this gas was in quantity can be disproved if in no other way than by stating that no damage has occurred from open lights hitherto and that the method of ventilation was by a furnace till the close of 1903. However, gas is said to have been heard issuing from auger holes and the gaseous condition has probably not been improved by the pass-

venting currents." On the other hand, class "A" includes all mines known to liberate firedamp, but the judgment of the mine inspector gives him such a degree of latitude that the classification does not necessarily show the absence or presence of gas. The minimum current passing through a mine of class "B" is required to be not less than 100 cu.ft. per min. for each man in the mine.

THE COAL SEAM

Some 30 beds of coal have been uncovered on Cross Mountain, but only three are over 36 in. thick. The seam worked at the Iron Co.'s mines runs

excellent quality and of the following analysis:

ANALYSIS OF KNOXVILLE IRON CO.'S COAL

	Per Cent.
Fixed carbon	55.10
Volatile matter	40.75
Ash	3.40
Moisture	0.75
	<hr/>
Sulphur	100.00 0.78

It has definite face- and butt-cleavage. It is not possible to give a well known name to the bed worked at Briceville, but it is termed in Tennessee the Coal Creek bed. This seam is extensively worked. The U. S. Geological Survey, which has surveyed the Briceville quad-



SHEDDED MINING TRACKS OF CROSS MOUNTAIN No. 1

ing of the headings over a trifling "saddle," by the greater distance attained from the cropping of the coal and by the increased depth from the surface.

MINE CLASSIFICATION

It may be here stated that under the Tennessee law the mine was a class "B" mine, which is defined as one "that is dry or dusty to such an extent, as in the best judgment of the chief inspector, renders it subject to dust explosions, and where coal or other dust is deposited on timbers, sides and bottoms of airways, entries or other workings of the mine and where the danger would be increased by too great a velocity of the

from 3 ft. to 4 ft. 6 in., with an average thickness of 3 ft. 10 in. Irregularity in thickness of deposition seems to be a marked characteristic of the section. The coal is improving in character as the work extends. The earlier work was in dirty coal, the roof being badly seamed and containing fireclay, but at a distance of about 4000 ft. from the drift the coal becomes unaffected by breaks, the roof becoming firm and reliable. The weakness of the roof caused it to fall continuously along the entries. As a result, the main entries in the old portion of the mine are as much as 8 to 14 ft. high.

The coal is a bright, clean coal of

rangle, has left the correlation of the coal seams as a problem not safely soluble at the present stage of geologic exploration.

CROSS MOUNTAIN MINE No. 1

The mine is opened in a simple manner. One long, straight, face entry and a parallel airway penetrate Cross Mountain several miles, and from this entry are driven, to right and left, several butt-entries. There are 28 butt-headings to the right, the last being only just started from the main heading. On the left are 26 butt-entries. As the mine dates from the year 1888, it will be readily understood that much has been mined out.

the 14th Right and 16th Left and all earlier headings being finished. The butt-headings each consist of a haulway and parallel airway.

The mine was ventilated by a 7-ft. fan driven by an electric current of 250 volts. This fan for some reason not easily explained was placed at the foot of a shaft, 100 ft. deep. It was placed on a high ridge crossing the heading so that natural draft lessened the work demanded of the fan. This fan was speeded to about 300 r.p.m. In 1905, it was reported by the inspector as "too small for the area under development, which it has to ventilate; and, but for the

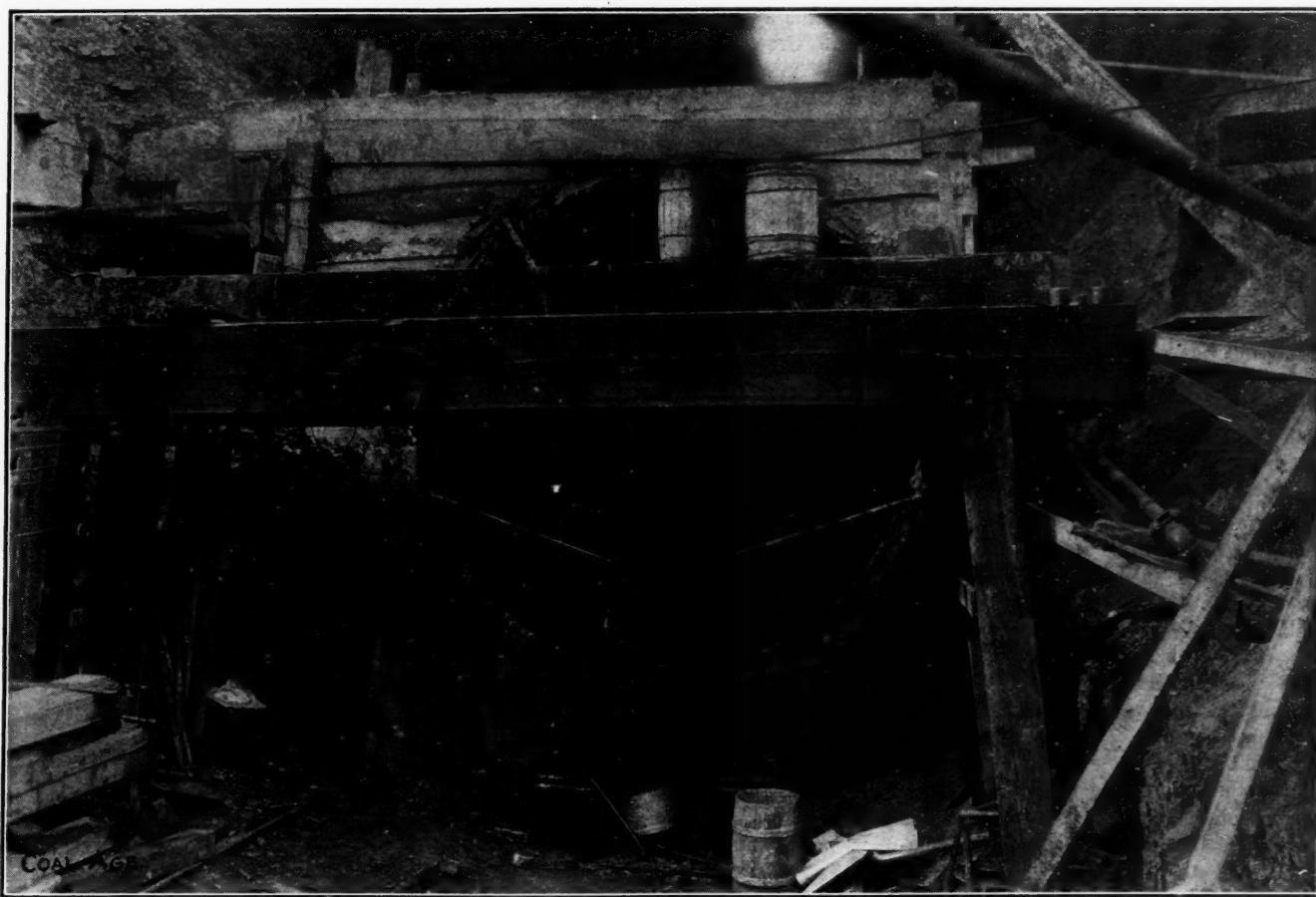
THE EXPLOSION

The explosion occurred at 7:20 a.m. As often happens, a delay in receiving railroad cars had held up the morning's work. Three men who had gone into the mine with the motor had just returned and 11 men were preparing to go in when the explosion occurred. It is thought that there were 89 men in the mine at that time. As the mine employs about 130 men rumor has persisted in putting the number at 125 and, at first, the men in Cross Mountain, No. 2 were erroneously included in the probable deathlist. There seems to be no

of the force of the blast could be seen even near the driftmouth. The timbers were in many cases scorched as if by lightning.

RESCUE WORK

The rescue work was delayed by the large amount of smoke escaping from the workings and by the bad condition of the headings, the natural results of so violent an explosion. As the fan in the mine was completely destroyed, a fan, shown in the illustration, was brought from the Black Diamond mine adjacent and was set in the mouth of an old drift. This fan forced air into the mine,



THE 10-FT. FAN FROM BLACK DIAMOND MINE, FORCING AIR INTO WRECKED MINE

splendid brick brattices on either side of the main entry, it would be impossible to furnish the adequate amount of air necessary to maintain safe conditions. However, credit is due the men for the air-current passing through the large mine." These brick brattices were placed all along the main entry, the side entries being bratticed with stone or wood, for the most part. The air went up the main entry to the face and returned by two long splits, each of which traversed, in turn, the long working headings to the right and to the left of the main entry. The coal was hauled partly by mules and partly by motors of the Goodman Manufacturing Co.'s make.

doubt but that the explosion originated on a butt-entry to the left, probably not far from the 23rd entry. At this point, the explosion was severe, blowing the gob out of the mouth of the entry into the main face heading with such violence that the heavy iron rails were bent considerably out of line. But the explosion and resulting expansion of gases filled nearly the whole mine. In headings on both sides of the main entry, men were found burned and bruised, showing that both splits of the air-current were affected. The large timbers securing the roof in the lofty haulageways near the mouth of the mine were, in many cases, blown down and, indeed, the evidences

and proved a potent factor in the subsequent work of recovery.

When the rescue car of the Bureau of Mines arrived, the direction of the underground work was committed to the representatives of that bureau, the president of the coal company, T. I. Stevenson, assisting the work by maintaining an efficient organization outside and by forwarding men and supplies to aid in the work of clearing the heading. Much of the rescue work was led by J. A. Holmes, the director of the bureau, and by J. W. Paul, the chief of the rescue department, in person. A great deal of helmet work was made necessary by the difficulties in reestablishing the air-current.

THE MEN WHO WERE SAVED

The following statement of William Henderson, one of the five men saved after being in the mine nearly 62 hr., was obtained on a visit to his house. His appointed work was drawing a pillar in Room 45 of the 19th Left. The explosion took place as he was about halfway up his room on his way to work. He felt the concussion and heard a noise, but did not think any considerable explosion had taken place. His boy was at the mouth of Room 47 above him and he shouted to him, asking him what he was doing, thinking that he might have caused what little noise and wind-rush he had heard. Looking around, however, he saw smoke, and with his son he went toward the sidetrack of the 18th Left, the coal from 19th Left being drawn into that sidetrack by a diagonal roadway. They went some distance and dropped down in the smoke. Both of them went to sleep, but for what length of time they do not know. Later they woke up and the father suggested their going on further in the same direction. They later met five men from 18th Left. These had already gone out to 16th Left and had come back to find the Hendersons. So together all the men went to 16th Left, the air getting better as they went.

IMPROVISED SAFETY CHAMBER

In that heading they built two brattices of slate about 60 ft. apart. They made these approximately gas-tight by throwing slack into the crevices. They stayed there until 9 o'clock Monday (the 11th). They had their dinner pails, but the food was spilled out or spoiled. There was water in tubs which had been used by the mules for drinking purposes, and this dubious liquid was all they had to drink. They felt they could not live in the atmosphere long, as it was becoming befouled, both by their own lamps and by the leakage from outside. The air became so foul that they could only keep their lights burning by fanning fresh air toward the flame. Two men left them at 2 o'clock, Saturday. They have since been found dead. The other men, as aforesaid, stayed till the morning of Monday, when they returned to the sidetrack of the 18th Left. There was no improvement in the air. So they went to the door of the same heading and were met by the rescue corps. The men who had worked in 18th Left were burned. In that heading Dora Irish left his father, as he was dead and penned in under a roof fall. The rescue of the five men aroused great hopes that more would be found alive. Knocking was alleged to have been heard in the Thistle mine, a Coal Creek Mining Co.'s operation, between Cross Mountain No. 1 and Fraterville. It lies to the right of the devastated mine, and it was thought that as the explosion originated

on the left, there might be some hope of saving some men toward the right. Chalk marks were found on the walls, but no men. Finally some were found in the section thus marked, but they were dead.

A DANGEROUS MINE

The Cross Mountain mine was perhaps as well conducted as any mine in its vicinity. In fact, to some it appeared better than any. There was not an excessive number of men in the splits. The bratticing was efficiently performed in the heading. It would seem, however, that an excessive amount of work stood open, at one time, for such a small production. The ventilation should always be proportionate not alone to the men engaged, but to the extent of the workings.

Still, Cross Mountain No. 1 was a dangerous mine, with just enough gas to

ing of breakthroughs. (3) Shots in rooms shall not exceed three in number. (4) Use of slack or auger dust for tamping must be discontinued and clay or sand used instead. Some rules follow as to the handling of powder.

INADEQUACY OF THE WATER CAR

But the following of these rules alone could not suffice. Nor could immunity be expected from an occasional sprinkling by a water car. The dust should be almost entirely removed, and humidification should be by steam. In a mine full of gob-headings the dust must be resting on the rock ledges along every entry so gobbed. The water from a water car cannot reach such accumulations. Steam alone can overcharge the air with moisture, so that every place that the steam enters is wetted. Water cools the air



THE MAIN ENTRY INTO CROSS MOUNTAIN NO. 1. UNAFFECTED BY EXPLOSION

make the employees unsuspecting, and more than enough dust to make fearful in result the most trifling explosion. Trite but wholesome is the reiterated statement that the least dangerous mines are often the ones to be most dreaded. A dusty mine does not fill the men in it with sufficient apprehension, and a little gas, which never burns anyone, is looked upon with complaisance. The dusty condition has been viewed with apprehension by the inspectors. On July 10, 1897, sprinkling was ordered. In 1905, R. A. Shiflett, chief mine inspector at that time, ordered (1) that the mine be thoroughly inspected by a competent boss within three hours before each shift and before men enter the mine. (2) Shots in headings shall not exceed three in number past the last crosscut. This includes the turn-

with which it comes in contact, for the air is a little warmer than the water, and its evaporation effects a further cooling. So that were it possible, which is far from true, for the water to saturate completely the air exposed to the spray, the temperature being lower than that of air yet to be met, precipitation of moisture from the air cannot be expected; the air, in fact, will still be able to drain more water from the mine wherever the absence of the cooling spray permits the temperature of the air to rise. Thus all a water car can do is to wet the main roadway and dampen the air to a degree less than saturation, leaving the air-current free to absorb moisture in its further course along the heading and in the rooms. And it is well known how inefficiently it waters slack, which will not

absorb it, and how tardily the water is absorbed by the air.

THE MINE CAR

The large amount of dust was due in part to the use of a type of car that is not uncommon in the Coal Creek district, but which cannot be too strongly condemned. In these days the tendency is toward a dust-tight car. The car in use was built without a front gate and with an 8-in. rear plank. To replace the front gate is a bar of iron, hinged at one end and latched at the other. On the flaring sideboard is a revolving latch rod, the end of which can be passed through a long slot in the crossbar mentioned. On turning the rod, an offset in the end stands crosswise of the slot and holds the bar in place. As the latch rod is turned to a right angle at its other

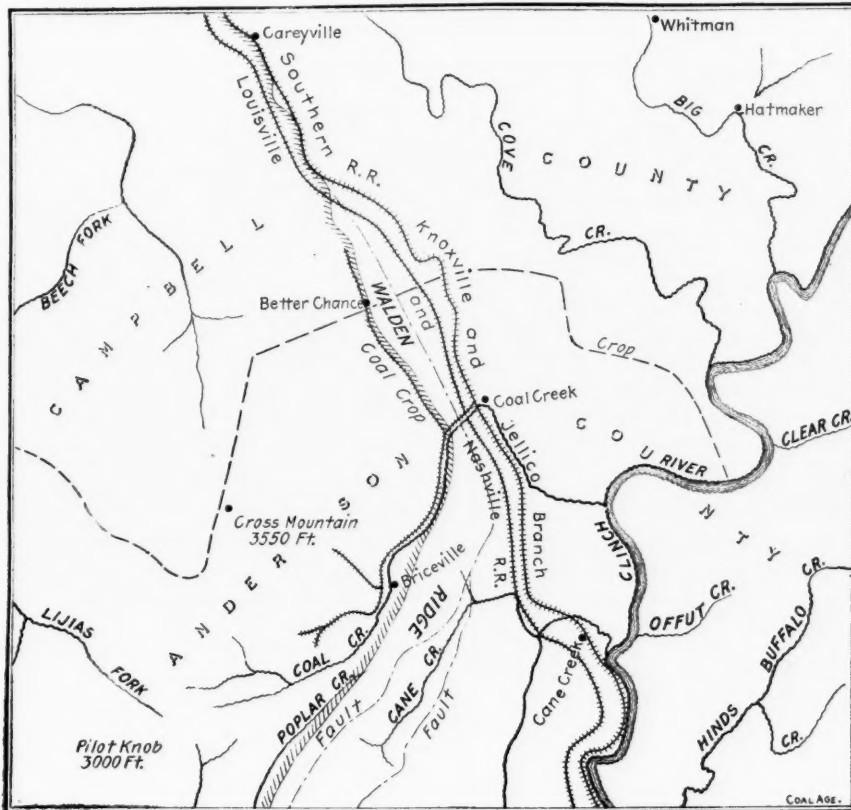
it is possible that the old advice, which we most need to learn and follow, is the necessity of properly humidifying the mine air, the need of tight cars, the care in the placing of the fan, the danger of a dusty mine and the terrible menace of a little gas. It may be said that at Briceville there is little lack of intelligence among the miners. That is well proved by what has been said about their steadiness in danger, and their consideration for one another when facing death. They are all native Tennesseans and Kentuckians. Not a colored man nor any convicts were employed in the mine.

fact that it requires endless costly repairs. In most cases the dilapidated condition of timber pockets is the result of inadequate supports.

The combination concrete and wood pocket has many of the good qualities of the all-concrete pocket, and can be erected at a much lower cost. Such a pocket has reënforced-concrete columns and floors, with wooden walls, thus using concrete where the greatest strength is desired and where the most rapid depreciation is likely to occur. Mr. Monks states that one of the principal reasons that the cost of construction is lower for the concrete and wood type than for the all-concrete pocket is the fact that in the construction of the former type the wooden forms employed in making the concrete floors and supports are afterward used for building a part of the bin and wall partitions, thus effecting an additional saving beyond the gain from not having to use so many forms. In the all-concrete type the forms are usually thrown away. The second, and perhaps most important item in lowering the cost of these pockets, is the fact that mass concrete per cubic yard is much less expensive than light wall construction. In many cases concrete walls for pockets cost from \$1.50 to \$2 more per ton of pocket capacity than timber walls.

According to figures compiled by Mr. Monks, the interest alone for 15 years on the extra cost of an all-concrete pocket will more than pay for the entire replacing of the wooden walls of the combination type. In addition, it is difficult to make alterations in the all-concrete pocket, while they may be made with comparative ease in the combination type.

Mr. Monks admits without question that the all-concrete pocket is the best in many respects, but has found that the largest return from the money invested is secured with the pocket of concrete and timber.



MAP SHOWING BRICEVILLE AND SURROUNDING COUNTRY *

end, a blow at that extremity revolves the rod, loosens the catch and releases the crossbar. The coal is built up from the very floor of the car, large lumps being placed against the bar and slack shoveled in behind.

The fan, being located in the mine, at the foot of the shaft, instead of on the surface, was destroyed by the force of the explosion. Why such a location should have been chosen is hard to say. Had the fan been intact the rescue work would have proceeded with less delay.

The Cross Mountain mine disaster probably comes with no new lessons, but

interesting to note the opinions in this connection of Archibald G. Monks, of Monks & Johnson, Boston, architects and engineers for coal-handling plants. In his remarks on this subject, Mr. Monks refers to three general types of coal pockets in common use: (1) The all-wood; (2) the combination concrete and wood; (3) the all-concrete.

As to the respective advantages and disadvantages of each type, he remarks that the wooden pocket, while much the cheapest to construct, is subject to the most rapid depreciation, and offers the greatest fire risk, to say nothing of the

Don'ts for Boiler Attendants

Don't overload the safety valves or tamper with them.

Don't let the water level sink out of sight.

Don't allow the cocks and valves to set fast.

Don't open the steam stop valves hurriedly.

Don't empty the boiler while steam is up.

Don't open manholes before easing safety valves.

Don't raise steam hurriedly.

Don't use unknown scale solvent or compositions.

Don't shake ashes against boiler fronts.

Composition of Mine Gases

By G. A. Burrell*

The Bureau of Mines has, in the study it has been making of mine gases, examined samples of gases taken under different conditions, analyses of which are here presented.

INCOMPLETE COMBUSTION OF METHANE

No. 1 Sample: Incomplete combustion of methane. Original mixture contained 10.03% CH_4 .

PRODUCTS FOUND AFTER EXPLOSION

10.16%	CO_2	0.00%	O_2
2.13%	CO	0.00%	C_2H_4
1.39%	H_2	0.00%	CH_4
86.32%	N_2		

No. 2 Sample: Incomplete combustion of methane. Original mixture contained 10.94% CH_4 .

PRODUCTS FOUND AFTER EXPLOSION

8.35%	CO_2	0.00%	O_2
4.47%	CO	0.00%	C_2H_4
3.66%	H_2	0.00%	CH_4
83.52%	N_2		

In these experiments pure methane was prepared and mixed with air in such proportion that not enough of the latter was present for the complete combustion of the methane. The mixtures were then exploded and the products of combustion examined. The most explosive proportion of methane and air contains 9.47% of methane. When the latter is increased above this figure, certain products are formed, about which there has been some disagreement. Some investigators have gone on record as saying that no carbon monoxide is formed.

According to these experiments the carbon monoxide and hydrogen increase, and the carbon dioxide decreases as the methane content of the original mixture is raised. Olefine hydrocarbons, acetylene or unburned methane were not found in the products of combustion. The carbon monoxide and carbon dioxide formed, contained all the carbon originally present in the methane. To the carbon monoxide formed in this manner is due some of the carbon monoxide found in the afterdamp following mine explosions. Not all of it, however, and in many cases the smaller proportion, is formed in this manner, because the incandescent carbon of heated coal dust appears to be mainly responsible for the production of the carbon monoxide found after dust explosions by the reduction of CO_2 .

CREVICE GASES AFTER SHOOTING

Crevice samples obtained after explosives had been fired in coal mines.

NO. 1 SAMPLE

16.8%	CO_2	17.3%	CH_4
22.8%	CO	8.9%	H_2
4.3%	O_2	29.9%	N_2

NO. 2 SAMPLE

9.1%	CO_2	14.1%	CH_4
3.2%	CO	4.1%	H_2
7.5%	O_2	62.0%	N_2

Carbon monoxide may be present in exploded firedamp and in waste products of shots. Oxygen is depleted to 3% in stagnant air. As much as 5% of methane may be found in a nongaseous mine. Extinctive atmosphere for lamps defined. Simple apparatus for measuring CH_4 .

tend to his shot. In one case, 0.16% of carbon monoxide was found, a harmful quantity. The experimental shots were fired under conditions which do not represent the best practice.

Other experiments are being carried on by the bureau to obtain further data on this subject, so as to determine the conditions which lead to the production of harmful quantities of noxious gases. Work thus far accomplished shows that it is bad practice to proceed immediately to the face after a shot has been fired. Even those powders which contain within themselves sufficient oxygen for the complete combustion of the carbonaceous matter present in the explosive, produce, when fired in coal mines, some carbon monoxide, due to a reaction with the carbon of the coal dust. Some explosives, however, are deficient in oxygen.

DETERIORATION OF MOTIONLESS AIR

COMPOSITION OF GASES FROM AN INCLOSED AREA IN AN ANTHRACITE MINE

Sample No.	Date	PERCENTAGES				
		CO_2	CO	O_2	CH_4	N_2
1	Oct. 31....	2.2	0.0	15.0	14.0	68.8
2	Nov. 1....	2.3	0.0	14.6	18.1	63.0
3	Nov. 2....	2.6	0.0	6.2	24.2	67.0
4	Nov. 2....	2.9	0.0	5.7	29.3	62.1
5	Nov. 3....	2.8	0.0	4.1	34.9	58.2
6	Nov. 6....	2.6	0.0	3.0	53.0	41.4

The gases, in this series, show the composition of the atmosphere in an inclosed section of an anthracite mine. This section of the mine was sealed off because of a fire which existed in an adjoining section. The fire did not affect the particular area from which these samples were obtained, because of a heavy intervening roof fall; consequently the gases represent those trapped and given off normally in a stagnant section, except that a stopping was leaking and some air was finding its way into the interior from the ventilating current. The stopping was tightened and the rapid absorption of oxygen by the coal is shown by the third analysis. Four days later the oxygen had dropped to 3%, even though some air was finding access to the inclosed area. The rapid accumulation of methane is also shown, 53% on the sixth day.

METHANE IN NONGASEOUS MINE

COMPOSITION OF GASES FROM AN INCLOSED AREA IN A BITUMINOUS MINE

Sample No.	PERCENTAGES				
	CO_2	CO	O_2	CH_4	N_2
1	1.50	0.00	9.30	5.29	92.91
2	1.20	0.00	0.30	5.37	93.13

This series of samples represents further, gases obtained after explosives had been fired to break down coal. The crevice samples were obtained by proceeding immediately to the face after the shot had been fired and collecting the samples as the gas exuded from the coal crevices. In each case a wait of 4 min. was made, and then the sampler proceeded to the face to collect another sample at about the place the miner would stand to at-

This series of tests shows the composition of gases from an inclosed area in a bituminous mine. A mine fire had once existed in the area and these samples were collected by means of breathing helmets, nine months after the fire had originated and prior to the reopening of the mine. The oxygen had almost entirely disappeared. The mine is classed as non-gaseous, yet an accumulation equal to over 5% methane had taken place.

BITUMINOUS MINE-FIRE GASES

Sample No.	PERCENTAGES					
	CO ₂	CO	O ₂	H ₂	CH ₄	N ₂
1	8.07	1.58	1.69	1.37	3.39	83.90
2	9.14	1.32	1.83	1.03	3.60	83.08
3	2.93	0.56	10.34	0.13	0.82	85.22

Samples Nos. 1 and 2 in this series were obtained directly from a fire area, 4 and 7 hours, respectively, after the mine had been sealed off. The fire occurred just inside the pit mouth of a drift bituminous mine. Samples were obtained by boring holes through the thin roof covering. These analyses, with others, showed that air was not leaking in to an appreciable extent, and the existence of an atmosphere that could not further the progress of the fire. No. 3 analysis of this series represents the atmosphere in the same mine about 1400 ft. away from the seat of the fire. An entrance was made through another entry in the mine, with oxygen helmets, and samples of gas were obtained. The party could not proceed farther because of a heavy pall of smoke. It was impossible to better shut off the air, because of various small openings in the outcrop. The oxygen content in sample No. 3 of this series was viewed with some uneasiness, but because of the stagnation of the air and accumulation of blackdamp, it was believed that appreciable diffusion of fresh air into the burning area could not take place. Such proved to be the case.

ANTHRACITE MINE-FIRE GASES

Sample No.	Date	Time	PERCENTAGES			
			CO ₂	CO	O ₂	CH ₄
1	Oct. 27	12:00 p.m.	3.5	1.3	8.3	11.5
2	Oct. 27	12:00 p.m.	3.8	0.7	9.6	13.1
3	Oct. 28	9:45 a.m.	3.4	0.6	10.9	10.8
4	Oct. 28	4:00 p.m.	3.4	0.6	11.3	10.3
5	Oct. 28	4:30 p.m.	3.0	0.4	12.6	9.6
6	Oct. 29	11:00 a.m.	3.3	0.6	14.1	9.0
7	Oct. 29	3:30 p.m.	4.0	0.8	13.6	12.0
8	Oct. 30	10:30 a.m.	4.8	1.2	10.1	14.1
9	Oct. 30	5:00 p.m.	4.0	1.0	12.2	12.2
10	Oct. 31	6:30 a.m.	12.2	0.4	6.6	6.6

These tests show the composition of the atmosphere in an inclosed area of an anthracite mine, while a fire existed therein. The bureau men arrived at the scene of the fire on Oct. 27. Dams were in place and water was being forced behind the dams in an effort to flood the

fire area. The dams were placed in steeply-pitching chutes, and the water after reaching the roof of the chutes at the dams, had to back up hill in order to reach the seat of the fire. Because of the pitching chutes it was difficult to make the dams hold water. Samples of the atmosphere behind the dams were obtained and analyzed. The first two analyses show the results of the first day's sampling. The two days following, despite efforts to tighten the dams, inleakage of air occurred to such an extent that the fire burst forth with renewed intensity. This happened when the oxygen in Sample No. 6 had risen to 14.1%. The air was inleaking through another dam, and some of the products of combustion were finding exit at the dam where Sample No. 6 was collected. The air fanning the fire into a blaze probably contained about 18% of oxygen.

After Sample No. 6 was taken, the fire was again brought under temporary control, as shown by the decrease in oxygen. The carbon dioxide and carbon monoxide also rose. Then air again started to inleak, and in order to avoid another outburst of fire, a carbon dioxide fire extinguisher was brought into the mine and carbon dioxide was forced behind one of the dams for five hours, checking the fire until new and tighter dams could be built. The rise in carbon dioxide, due to this cause, is shown by Sample No. 10, collected one-half hour after the use of the extinguisher had been discontinued. The new dams held water well and excluded air, so that the fire was rapidly brought under control.

MINE AIR IN PASSAGE

SAMPLES OF NORMAL MINE AIR FROM DIFFERENT SECTIONS OF A MINE WORKING THE PITTSBURG SEAM

Sample No.	Cu.Ft. of Air per Min.	CO ₂ , Per Cent.	CH ₄ , Per Cent.	Cu.Ft. of CH ₄ per Min.
1	17,400	0.04	0.10	17
2	21,600	0.06	0.94	203
Return 3	63,000	0.11	0.75	473
Face 4	Air still	0.12	1.80	
Return 5	79,800	0.15	0.19	152
6	21,600	0.06	0.10	22
7	31,500	0.13	0.70	220
Face 8	Air still	0.11	1.38	
9	39,200	0.15	0.75	294
10	8,100	0.09	0.34	28
11	11,400	0.06	0.14	16
12	32,400	0.09	0.94	305
13	23,200	0.05	0.95	220

These tests show the carbon dioxide and methane in the normal mine air of different parts of a large mine working the Pittsburg coal seam. At the time the new Pennsylvania mining code was proposed, embracing certain features relating to the percentage of methane allowable, one of the mining companies asked the bureau to sample the air in its mines with a view to determining just how much methane was present. Since that

time the bureau has trained a chemist for the work, installed a gas-analysis apparatus, and the company is now having daily analyses made. It can be stated that the bureau will do this much for other mining companies if they desire closer methane determinations than the safety lamp will show. It might be mentioned that the state inspection department of Alabama, among others, is being given similar aid. The chief mine inspector is installing a laboratory in his office and his men will frequently send in samples.

ATMOSPHERES EXTINCTIVE TO FLAME

Lamp	PERCENTAGES	
	CO ₂	O ₂
Wolf lamp, bonneted.....	3.00	16.50
Wolf lamp, without bonnet.....	3.00	15.82
Bunsen burner (natural gas).....	3.25	13.90
Acetylene lamp.....	6.30	11.70
Candle flame.....	2.95	16.24

In these experiments, the different flames were placed under a 10-liter bell-jar and the atmosphere analyzed after the flames had become extinguished, due to the consumption of oxygen. It might be well to call attention to the tenacity to existence of the acetylene flame. In other words, it will burn in an atmosphere in which the ordinary flame cannot exist. Also, that it is bad practice to work in atmospheres deficient in oxygen to the extent any of these analyses show.

AFTERDAMP

The following test shows the composition of some gas samples obtained from a mine about 18 hours after an explosion had occurred therein:

NO. 1 SAMPLE

1.37% CO ₂	1.23% CH ₄
0.60% CO	0.28% H ₂
18.14% O ₂	78.38% N ₂

This sample was obtained at the face of an entry by bureau men equipped with oxygen helmets. The ventilation in this section of the entry had not been restored. The seat of the explosion was supposed to have been close to this place. A canary bird, carried by an exploring party unequipped with helmets, collapsed as it was being carried in this entry about 200 feet back from the face. The men retreated without suffering any distress. The bird revived quickly when brought back to fresh air. The sample is further interesting in that 1.23% of methane was found to be present. This particular explosion was supposed by some to have been originated by the flash of short-circuited electric wires igniting coal dust, but the fact that considerable methane was found at the face points to the possibility of firedamp playing some part in the catastrophe.

NO. 2 SAMPLE	
0.32% CO ₂	0.19% CH ₄
0.04% CO	0.00% H ₂
below 0.02%	
20.50% O ₂	78.95% N ₂

This sample was obtained in a section of the mine where ventilation had been partly restored. Even so, 0.04% of carbon monoxide was still present. Our party and others spent some considerable time in this section without feeling any effects from the whitedamp, although one member stated he did not feel very well. This man had, however, been traversing this and other sections of the mine for 7 or 8 hours; consequently it is possible that he had been breathing small percentages of carbon monoxide a large part of the time. Eight men lost their lives in this explosion, and at least six of them were overcome by carbon monoxide. Some of the rescue party also experienced narrow escapes from the afterdamp. If they had provided themselves with canary

and the contraction in volume due to the burning of the methane is determined by again measuring the sample. This contraction in volume when divided by 2 and calculated to a percentage basis gives the amount of methane present.

The measuring vessel or burette has a total capacity of 50 c.c. and is divided into the bulb at the top, having a capacity of 45 c.c., and the stem, which has a capacity of 5 c.c. The stem is graduated in 0.05 c.c. or twentieths. Water is used both in the measuring and burning vessels. The apparatus works on no new principle but follows the method adopted by Coquillon, Winkler and others who burn the methane out of a measured volume of mine air.

The Bureau of Mines has assembled other types of gas-analysis apparatus more accurate than the one described, which are, however, not simple to operate, and are meant for the use of chemists.

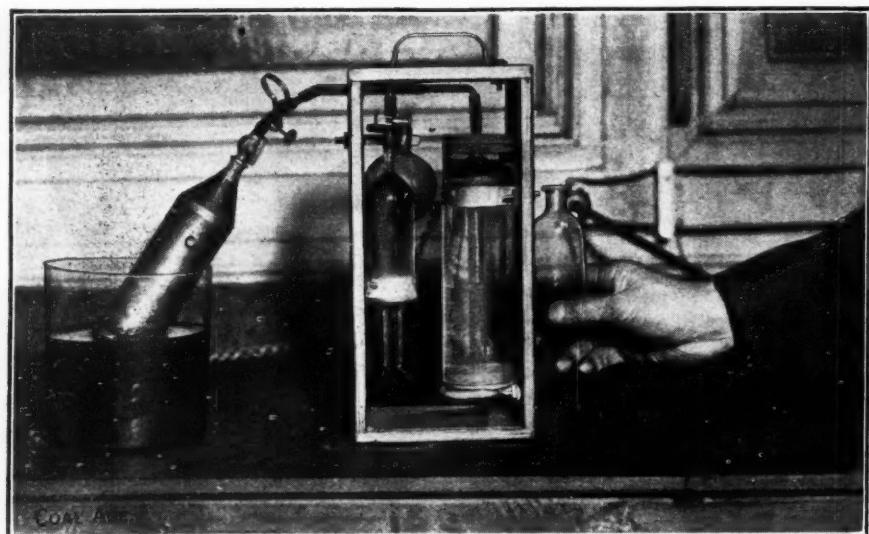


FIG. 1. APPARATUS FOR DETERMINING PERCENTAGES OF METHANE

birds in the beginning of the explosion work, it is probable that a large part of the distress experienced by them would have been avoided.

METHANE APPARATUS

Fig. 1 shows a simple gas-analysis apparatus which has been assembled especially for the use of mine superintendents, foremen and inspectors. Methane can be determined with an accuracy of 0.1% in less than 10 min. It consists of a measuring vessel *a* for measuring the gas, and a burning vessel *b* for burning out the methane from a measured volume of mine air; *c* is the sample pipette. The mine air is drawn into the measuring vessel *a* from the pipette *c*, measured, and passed into the burning vessel *b*. The platinum wire therein is electrically heated to a white heat and allowed to remain so for 3 min. The current is then broken and the pipette cooled. The mine air is then drawn back into the measuring vessel

Purchase of Locomotive Fuel Coal

By R. D. QUICKEL*

Frequently it is impossible for a railroad to use a certain grade of coal because it will not burn under the same conditions as other coals which are already in use, although it may be of excellent character as to its heating value, ash, sulphur content, etc. One of the worst practices in vogue today on railroads is the use of a variety of coals in a certain district or division. The locomotive fireman is the man who is chiefly responsible for the proper use of the fuel, and when he has become accustomed to using a certain grade, many kinds of trouble are frequently experienced from forcing him to use a fuel with which he is not familiar.

*Fuel agent, Queen & Crescent Route.
Note—Abstract of address delivered before a meeting of the Kentucky Mining Institute, Lexington, Ky., Dec. 11, 1911.

While it is true that railroads demand coal cheaper than any other purchaser, it must be considered that the mine having a railroad contract, is assured of business for 12 months in the year with no further expense involved.

Coal furnished on a railroad contract must first be of such a character as to enable the fireman to keep up sufficient steam to run on schedule time. There is only one way of determining whether or not the coal is of a quality to do this, and that is by actual test. Analyses are useful as indicating the character of a coal and giving some idea as to what may be expected in regard to the amount of ash, clinker, corrosion of boiler tubes, grate fingers, etc., but cannot take the place of actual trial.

When it is considered that a railroad locomotive is about as expensive a piece of machinery as it is possible to buy, that a firebox temperature of 2300 deg. F. is necessary for its proper operation, and that all the various impurities that occur in coal tend to increase the operating expenses, it is readily understood that the railroad company must take every precaution to secure a high grade of fuel.

Some operators have heretofore taken the stand that preparation of locomotive fuel was not necessary, as the railroad would take it anyhow. While the railroads have not as yet adopted the method of buying coal on a premium basis, the day will soon come when the practice of purchasing fuel by a trade name will be exceptional. The reason for this is to be found in the fact that a trade name in so many cases obviously means nothing. Railroads are sometimes accused of favoritism in regard to placing their fuel contracts with large operators. If this is the case it is chiefly because the large operator can as a rule sell at a cheaper price and can be depended upon to fill his contract. The small operator, desiring to sell fuel to a railroad, must show first that he can prepare good coal at a reasonable price and second, that he is in business for every day in the year.

The preparation of the coal is a matter of great importance in engine fuel. Some experts contend that a certain percentage of slack in a coal is beneficial. Personally, I am inclined to believe that a run-of-mine coal containing not more than 30 per cent. slack is usually satisfactory. The objection to it arises from the fact that if there are any impurities in the coal, the highest percentage is to be found in the small sizes and fine material. I have found, by actual experiment, that there is an increased consumption of 33½ per cent. when using a 2-in. nut and slack coal as compared with 5-in. run-of-mine. It is evident, therefore, that a large percentage of slack should be guarded against.

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This journal is interested solely in matters relating to the fuel industries, and is designed to be a medium for the free interchange of ideas, the detailed description of coal-mining practice, and the expression of independent thought calculated to benefit both operator and miner.

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COAL AGE

Mine Examinations for Certificates of Competency

The question of competency of mine officials in direct charge of work in and about coal mines is attracting increased attention in all mining states. It is universally conceded that the men in direct charge of operations in coal mines should be competent to perform the duties that rest upon them by virtue of their official position and authority.

The work involved in the operation of a coal mine naturally divides itself into two or more general classes or grades of work, which may be styled as management, supervision and operation. In large companies, operating a number of plants, there are numerous subdivisions in each group, requiring general managers, managers and assistant or district managers; general superintendents, superintendents and assistant or division superintendents; general foremen, foremen and assistant foremen, and bosses, mine bosses, firebosses, boss-drivers and timbermen.

In mining work, as in all dangerous occupations, there arises the acknowledged necessity for the competent direction of work, to the end that the same may be performed with due and reasonable regard for the safety of the workmen employed.

A workman is under orders to do a certain work—he is not in a position to dictate to his boss. If a workman is unwilling to obey, because he considers the work unsafe or dangerous, it is his privilege to step aside for the man who follows. The workman may be ignorant in respect to mining work; he may be lazy and too ready with excuses for not doing the work ordered; he may be a coward and willing for the other fellow to do the hard work, the work that requires courage and skill.

It is plain, therefore, that the question of safety, as far as the company is concerned, must be decided by the mine foreman or mine boss who is there and in immediate charge of the work. He should be the "competent" man and the

man who should be *morally* responsible for the safety of his men. We say *morally* responsible, because it seems right and just that the mine foreman or boss can only be held legally responsible for neglect or failure to perform his legal duties, while the operator or company is likewise responsible for the employment of an incompetent person, should this be shown to be the case.

Much depends, in the solution of this question, on what constitutes a "competent" person. Can competency, within the meaning of the state mining laws, be determined by an examination of candidates? If the competency of a candidate can be so determined, who should conduct the examination; and under what authority is the certificate of competency to be granted to the candidate? Finally, does the granting of such certificate of competency by a state board of examiners, duly authorized by the state mining law and commissioned by the proper officer of the state, make the state responsible for accident that may occur under the supervision of such certified person? We think not.

It might be argued with equal force that the certification of stationary engineers by a municipality, or the inspection of boilers by a city boiler inspector, makes the city responsible for accidents due to manifest incompetency on the part of such certified official; or the licensing of physicians to practice, makes the state responsible for deaths due to their mistakes.

The fact is that the city or state, in examining and certifying to the competency of candidates to hold certain positions of responsibility, is performing a gratuitous service tending to protect the lives and property of its citizens. The state or city makes no charge for the service rendered to individual operators, and no liability attaches to the government because such service is incompetent.

The question has been asked recently, "Should not the mine superintendent be compelled to pass an examination and hold a certificate of competency?" We

answer, that, in our opinion, this is not required by the exigency of the case. The superintendent is not the man in direct charge, at the point of danger. It is true he is the mine foreman's superior officer, but his province is one of supervision.

The best mining laws without exception give the mine foremen full charge and power to direct and control the ventilation of the mine and all supplies required to make the mine safe. The same law makes the fireboss the highest authority regarding the gaseous condition of the mine and gives him full power to admit or exclude men from the mine. These two officials are, therefore, the men in charge, and the law requires them to see that the mine is safe; and, for this reason, they should be certified as competent for their respective work.

In how far does the present system of conducting examinations of prospective mine foremen and firebosses serve to determine their several competency and fitness for the positions of responsibility they seek? In many cases, the law specifies that the candidate shall possess a technical knowledge of the principles of ventilation, properties of gases, methods of working, operation of mining machinery, surveying, etc. In one case, at least, which we hope and believe is exceptional, the law specifies that, "During the progress of the examination, books, memoranda, or notes shall not be allowed."

Does this law contemplate that the candidate shall memorize the formulas, constants and values necessary to pass a technical examination of this character; and is the intention of the law makers, here, to debar from the responsible positions of mine foreman and fireboss all persons who cannot memorize the formulas and tables found in every mining handbook?

Mining handbooks are for the use of practical mining men. These men should be familiar with their contents—not by memorizing the formulas and tables they contain, but by knowing where to find the formulas and values required to work any mining problem. Mine-examining boards should allow candidates the free use of any handbooks they desire to bring to an examination where technical questions are asked. The candidate uses these in mining practice, at home or in the office—why not in a technical examination?

We must not lose sight of the fact that what is needed are able and practical men, with sufficient technical knowledge to make them competent to handle the problems that arise in daily mining practice. The best practical men are not men who can memorize formulas, but who can find and use them when required. COAL AGE strongly advocates the use of textbooks in all technical examinations.

There should, besides, be one written and one oral session, in the examination of each candidate, in which no handbooks should be allowed. In the written session, questions should be asked calling for experience on the part of the person examined. In the oral session, the examination should be designed to show the quickness of the candidate to determine the best plan of action to rescue men entombed by a heavy fall; to save men and control a fire started on the main intake air-course; to control a sharp squeeze, and other like questions requiring ready answers.

The examination of firebosses should be less technical than that of mine foremen; it should aim to show the candidate's knowledge of gases, ventilation, timbering, and his acquaintance with mine maps and surveying. A sight-test should be required that would show the ability of each candidate to detect a flame cap on the common Davy lamp, and to estimate from its height the percentage of gas in the air.

In order to make mine examinations, to determine the competency of candidates, achieve their desired purpose and secure the best men, examining boards must study closely the needs as well as the conditions surrounding the men they examine. The examination is necessarily quite different from an ordinary school examination. Its aim should be to show a competent knowledge, coupled with a sufficient experience, and an ability to think and act.

Percussion

In the communication of Mr. Verner, which appeared in COAL AGE last week, he remarks that the report of the Adrian disaster published in our columns ascribed the explosion to the fall of an electric wire. But that report took no such assured stand, and while stating that "the explosion must have been due to short-circuiting of an electric-haulage wire," added, "or possibly to the leaving

of dynamite or caps within the mine, despite the fact that the use of dynamite is forbidden at Adrian except for the shooting of rock headings." This is not entering a defense of anything which was contained in that article, but is rather a protest against overlooking a not improbable initial cause.

The heading, known as the 13th Left, around which the explosion centered, had run to a rock roll, and the headingmen had been using dynamite in its extension. They might have *cached* a few sticks in a neighboring room at a point beyond the support of the room pillars, and when a cave occurred, the sticks might have been detonated by the percussion.

But why not go further and admit that black blasting powder, the fuses of permissive explosives or even the powders themselves may, if exposed to a fall of roof, be exploded by either the heat, a spark or the detonation of percussion.

The use of dynamite in 1896, when the first explosion at Adrian took place, was not as common as today, and permisives were entirely unknown in the United States. It is probable, therefore, that the first explosion arose from rock falling on black blasting powder. The permissive powders have been, it is said, abundantly tested by the Bureau of Mines to determine their explosibility from mechanical detonation. Only one, which contained chlorate of potash, failed to show a perfect resistance to such action. But it is not impossible that permisives carelessly handled so that freezing or nitroglycerin exudation can take place, may be the cause of explosion, if not kept where they are free from mechanical violence.

Care should be taken always to keep explosives away from parts of the workings liable to cave.

The necessity of periodical medical examinations of the eyes of firebosses is shown by the results of such an examination conducted at the Globe colliery, Wales, England. After a disastrous explosion caused by shot firing in a gaseous chamber, it was found there was 3 to 3½ per cent. of firedamp present, which was not detected by the fireboss because of defective eyesight; the examination clearly showed that out of 41 firebosses inspected by a government inspector, 31 were found to have defective eyesight.

DISCUSSION by READERS

*Comment, Criticism and Debate upon Previous Articles,
and Suggestions from the Experience of Practical Men*

Geology in Coal Mining

That applied geology finds one of its most useful fields in the exploration and development of coal lands would not seem to be open to argument, yet there may be some legitimate differences in opinion between engineers and geologists as to the proper functions of the geologist and the economic value of geologic work in coal mining.

The recent article by Prof. I. C. White and one by C. P. Collins, especially relating to the controversy that led to the Ott suit against the Berwind-White Coal Mining Co., while touching upon this subject, do not properly define the functions nor the limitations of the coal geologist. The competent coal-mining engineer is necessarily a geologist and must have a good working knowledge of the district in which he is employed, but his work does not require that broader knowledge of many districts which constitutes the capital of the consulting geologist.

Having been engaged for a number of years in professional geologic work and having had equal experience as an engineer in the operation and supervision of mines, I may perhaps be in a position to express an opinion of the value and importance of geology to the coal operator and miner that will be free from personal bias; for, as a mining engineer, I am willing to restrict the geologist to his proper sphere; and, as a geologist, I see no reason why the mining engineer should not be limited to those functions he is qualified to perform.

GEOLOGY AND THE OTT SUIT

It is unfortunate that the Ott suit should have been used to illustrate the value of geology in coal mining. Briefly stated, the case was one in which the Berwind-White Coal Mining Co., upon having acquired the right to mine a bed of coal described in the deeds of conveyance as the "B" or "Miller" bed, were sued by Mr. Ott because he believed the company was mining coal from a bed overlying the "B" bed, and one which John Fulton believed to be the bed "C prime." The question at issue was whether the bed being worked was in reality the "B" or "Miller" bed, long known and recognized by these names along the main line of the Pennsylvania railroad between Johnstown and Gallitzin, or some other bed. Mr. Ott contended that the coal worked was too close to the surface for the "B" coal and, as stated

by Mr. Collins, sunk several diamond-drill holes to learn the truth. Many geologists and engineers examined the cores from these boreholes and either failed to reach definite conclusions as to the identity of the several coals shown by these cores, or failed to substantiate their conclusions by arguments that would be accepted as proof in a court of law.

The matter was further complicated by the fact that between the region where the "B" or "Miller" coal had long been worked and recognized, and the mine in question under Mr. Ott's farm, there intervened several miles of territory in which this bed had not been opened and worked, and it was therefore impossible to trace bed "B" step by step, by mine workings, continuously from the first mentioned region to the Ott place.

Under such circumstances the identity of any bed of coal must always be largely if not entirely a matter of conjecture and not susceptible of legal proof. We know enough of the uncertainties and vagaries of coal beds to know that one may be replaced by another that normally should be found above or below it; that such a change may occur in short distances; that a bed normally thin may thicken to workable size and another normally thick may thin to small size or disappear entirely, and that the intervals between the coals, and between the beds of coal and the limestones, sandstones and other rocks, may increase or decrease in short distances, so that a bed of coal apparently found at a certain horizon may not be the bed normally present at that horizon but some other bed that is usually found higher or lower in the coal series.

IMPOSSIBLE TO ESTABLISH IDENTITY FROM BORINGS

To establish the identity of the coal worked on the Ott place from borehole cores therefore was manifestly impossible, and it was also impossible to prove the identity of the coal by actually tracing it through mine workings continuously from where the "B" coal was known and worked, because such workings did not exist. The actual identity of this coal may never be proved beyond question until such mine workings do extend continuously between these points.

While it was not possible to establish the identity of this coal as a legally proved fact, it was quite possible for engineers and geologists to present data that might be sufficient to convince an

engineer or operator that the bed being worked was or was not bed "B."

In preparing the defense in this case the Berwind-White company placed the preparation of the evidence in the hands of Mr. Baird Halberstadt, of Pottsville, who collected a large quantity of material in support of the company's contention that the seam mined was bed "B," and other geologists were called upon to confirm and strengthen the conclusions made by Mr. Halberstadt. But it must be remembered that while in this way a great cumulative mass of evidence could be presented, all of it rested upon the personal opinion of those who had examined these data, and the result therefore could not approach the dignity of a demonstration. In the same way the conclusions reached by Mr. Fulton and those who agreed with him were personal opinions, and could not be considered as proving the truth or falsity of either view.

DISTINCTION BETWEEN FACTS AND OPINIONS

While it may seem a waste of time to go into a matter of this kind at such length, it appears to me to be justified, because it is useful to emphasize a fact of which this case furnishes a most illuminating example; namely, that the geologist should distinguish more clearly between fact and opinion, between proof and surmise. Possibly Mr. Collins and Mr. Halberstadt may be right in their opinion, and personally I think that quite probably they are, and possibly Mr. Fulton may be right, but it should have been apparent to all concerned that neither party was prepared to prove anything. Mining operations stretching continuously from point to point, the actual opening of the coal along its outcrop at innumerable places, or a continuous row of boreholes, would have been necessary before anything even approaching the semblance of proof could have been adduced and offered as evidence in this case.

The geologist may often be thought to have an ability to identify coal beds not justified by the history of geologic examinations, and the public may often be ready to accept an exaggerated view of his ability in this direction. The history of all attempts to identify the coal beds of different regions or localities, whether such regions or localities are widely separated or are in close proximity to each other, furnish many examples of the errors which the geologist must inevitably

make. As an illustration of this, may be cited the identification of a bed of coal in the Morrisdale-Houtzdale Basin, in Clearfield County, made by the writer in 1884, and accepted for many years by operators as demonstrating the coal in question to be the "B" bed.

After working this coal bed for many years under the belief that it was bed "B," abnormally located 30 or 40 ft. higher than its proper place in the series, it was accidentally discovered that bed "B" existed below the coal worked, in its proper place and with its normal characteristics, and that the bed worked was in reality bed "C" (or a bed normally thin, lying close to bed "C"). Other instances will be found in the many changes in nomenclature and identifications made by Prof. White and others in attempting to work out the true succession and age of the coals in the West Virginia coal fields, a work that is still in progress.

GEOLOGIST VS. ENGINEER

It is extremely questionable whether in controversies of this nature either the engineer or geologist can profitably be employed by the contestants, for the character of the testimony must generally be confined to the personal opinion of the witness, supported by more or less disconnected facts, and such testimony is not usually of sufficient force to insure a final decision covering the points at issue. Recognizing these limitations many coal geologists decline to appear as expert witnesses or discourage their clients from calling them as witnesses, preferring to limit their services to the rendering of such advice as in their opinion may be of value to their clients.

In his relation to his clients, whether concerning suits at law or the development or purchase of mining property, the geologist is naturally in an advisory position and the value of his services must rest upon his ability to advise wisely. This will depend upon the nicety with which he can weigh the relative importance of all the matters at issue, including the general business and commercial conditions affecting the proposition, as well as the technical geologic facts, the opinions based upon these facts and the weight to be accorded to such opinions, and to serve his client most usefully he must be prepared to advise definitely and positively, because his client probably does not have such a sense of proportion regarding technical matters as will enable him to judge of their relative values, and is, therefore, quite likely to reach unwarranted conclusions or to be so confused by apparent inconsistencies as to be unable to form a definite opinion.

The functions of the mining engineer when engaged in an advisory capacity are well defined and are of a definite nature. He deals with the coal, ore or mineral deposit as an entity and with the

quantities, qualities, costs, prices and physical and mechanical problems of mining and preparing the material for market. Unless especially qualified by geological experience his field should not include those more or less abstruse problems of applied geology, which may embrace uncertainties, conjectures and geological hypotheses and theories, for these belong to the geologist. The mining engineer properly deals with known deposits and the methods of utilizing them, the geologist with unknown and partially known deposits to determine their extent and value.

H. M. CHANCE,
Mining Engineer.

Philadelphia, Penn.

The Foreman's Trouble

In recent issues of COAL AGE, you have been rather severe on mine foremen and superintendents. I believe almost every mine foreman and superintendent looks ahead to the future successful development of his mine. Furthermore, I am sure most of us have working projections made, and lie awake nights formulating definite plans for development.

The real trouble lies in the fact that the operator is too eager for returns on his investment, and wants to curtail expenses to the lowest notch. He reminds the superintendent at every opportunity, that he must keep down expenses, and of course, the superintendent passes it down to his foreman.

I do not claim all operators do this, but there are a great many who follow such a plan. As Mr. Mooreshead mentioned in a recent issue of COAL AGE, wide entries cause falls and squeezes, resulting in heavier expenses than if they had been driven narrow. This subject is of vital importance to the successful working of a mine, and I would like to read the opinion of some other mine foreman or superintendent.

Marion, Ill. SUPERINTENDENT.

The Human Element

Since the appearance of the editorial in COAL AGE of Dec. 9, on "The Human Element," another explosion has occurred. We have the usual report that the mine was in "excellent" condition and we shall read again the same story about "the model mine blowing up." What is more, we shall continue to read "the same old story" unless some "experts" get the "dust" out of their eyes and see things in their proper light.

It is true that "careless and vicious men find their way into the best of mines" and they are undoubtedly a menace, but that menace is fairly universal and it may be assumed that these "careless and vicious men" are just as plenti-

ful, and perhaps more so, in mines badly arranged and poorly managed.

I have a fairly complete record of mine explosions in the United States for the last 23 years, together with the conditions under which they occurred, and I have not found a single case in all these years where an extensive dust explosion occurred in a badly arranged and neglected mine, while, on the other hand, the record shows that the most violent and extensive explosions have taken place in mines that were—like the Briceville mine—in excellent condition.

These are facts and it would be rank slander to assume that the "experts" were not aware of their existence, but, knowing about them, the "experts" so far have failed to offer an explanation as to the cause. Why? It would be interesting, at least to some of us, to know the reason.

JOHN VERNER.

Chariton, Iowa.

Fair Play for the Mule

In the last issue of your paper, I note the article on "Fair Play for the Mule," by Joseph Virgin. In reference to the remarks he makes, relative to Eli Conner's recent article, I may say that while I believe that Mr. Conner's comparison of mechanical and mule haulage refers to actual experience at Ehrenfeld, it does not do so exclusively.

When gathering motors were installed at the Sun mine, in the New River field, I held the position of district superintendent, under Mr. Conner. At that time he advanced the same argument as Mr. Virgin, but I believe the performance of the motors in that mine did much to change his views.

If Mr. Virgin will compare the expense necessary to keep up mule haulage with that needed to maintain a motor haul in the same place, I believe he will find it is rather costly to give the mule "fair play"—especially if the bottom be fire clay and the road a little damp.

After a mule has tramped on a switch bridle, that switch is not much better, if as good, as the stub switch, which is generally used with mule haulage.

In making the comparison we must add the cost of the maintenance of the mule to the upkeep of the road, and keep in view the fact that the speed and the endurance of the motor enable it to transport the cars a greater distance than they could be hauled by a mule.

If we sum up the whole cost of giving the mule fair play, I believe we will find the account will show a balance in favor of gathering motors. In my estimation the place to give the mule fair play is on the farm, not in the mine.

G. M. SHOEMAKER,
Manager, Virginia-Lee Co.
St. Charles, Va.

INQUIRIES of GENERAL INTEREST

A Page Devoted to Those who want Information. All Questions must be Accompanied by the Name and Address of Inquirer

Preservation of Steel Rope

Is coal tar, after being treated with freshly slaked lime, injurious to steel-wire haulage rope? Will it cause the wires to become pitted, and could it possibly cause crystallization to take place in the wire?

Bella Ellen, Ala. SUPERINTENDENT.

This question is of great importance to all users of wire rope, in mine-haulage practice, and was submitted to the manufacturers of wire rope, in this country. Following are the replies received.

"Either coal tar or pine tar can be used on wire rope without detriment, provided the tar is first neutralized by boiling with freshly slaked lime. Unless the tar is thus completely neutralized, the acid, which it contains, will attack the steel, and cause brittleness.

"We do not advocate the use of tar, however, on running ropes, for the reason that it is practically impossible to thoroughly seal a rope in this manner. The tar hardens and strips off or cracks, allowing moisture to reach the rope, causing it to rust under the tar. We consider it is better to use a lubricant free from acid, and one that will penetrate the rope and preserve the inner wires, which are, after all, the reserved strength of the rope. We have found that many users who have covered or partly covered the outside of the rope with a heavy dope are, later, surprised to find that the inner wires have become corroded and lost their strength. It is best, in treating a wire haulage rope, to start with a lubricant that will penetrate, and then build up so the inner and the outer wires alike will be protected."

JOHN A. ROEBLING'S SONS CO.

Trenton, N. J.

"In the process of drawing wire, lime is used as a coating to protect the surface of the wire from corrosion. If a steel rope, coated with a mixture of coal tar and slaked lime, becomes pitted it cannot be due to any action of the lime, but rather to its insufficiency; or the fact that it has not been mixed so as to thoroughly neutralize the acids in the tar.

"We do not, however, advocate a mixture of coal tar and slaked lime as a coating for wire ropes, as it flakes off when dry. The compounds of pine tar are better, and those of crude petroleum and graphite better still. In this con-

nexion we draw attention to page 11 of our booklet, 'Wire Rope Preservatives.'

THE TRENTON IRON CO.

Trenton, N. J.

"We would advise that a composition of coal tar and lime is not injurious to wire ropes.

"Some years ago, before the advent of special lubricating greases, a composition of coal tar and lime was recommended by wire-rope manufacturers.

"It is probable these people have had trouble with sulphur water, which penetrated between the strands of the rope and pitted the steel. If the crystallization spoken of took place it might result from the action of the acid water on the steel, which destroys the structure of the steel and makes it brittle. The coal tar and lime could not produce this effect."

HAZARD MANUFACTURING CO.

Wilkes-Barre, Penn.

[We believe the above letters answer our correspondent's query fully and, in his behalf, we wish to thank the writers for the explanation.—EDITOR.]

Wet Rag in Afterdamp

I note that in your issue of Nov. 18, in the article on the Adrian Mine Explosion, you state that "two men had enough presence of mind to stop, dip their handkerchiefs in the tea contained in the tanks of their dinner pails and carefully wrap their mouths with the damp rags." What is the action of such a covering over the mouth?

PUZZLED SUBSCRIBER

Punxsutawney, Penn.

The question is a hard one and your letter suggests that you have realized its difficulty. It will probably not be news to you that the method of using a wet rag or sponge is one which has been repeatedly tried and found availing in work where air is vitiated. Doubtless you have also read that old explanation that water dissolves carbon dioxide, and so makes the air respirable. But as you may have considered, water only feebly dissolves carbon monoxide, and so that action is probably not one of solution or it would be without efficacy in excluding the most poisonous of the gases encountered. In fact, the order of solution in water at 68 deg. F. is:

ABSORPTION FACTORS FOR MINE GASES

Carbon dioxide.....	0.90100
Oxygen.....	0.03137
Carbon monoxide.....	0.02320
Nitrogen.....	0.01599

Moreover, the action of carbon dioxide is now realized to be objectionable rather as it replaces oxygen in the air than for any other reason. If 10 per cent. of CO_2 is absorbed, the percentage of oxygen will be increased one ninth of its former value. If 9 per cent. of oxygen is present the wet rag absorbing the last molecule of dioxide would only make that proportion 10 per cent. So the absorption of carbon dioxide but little improves the mixture.

An ordinary bandanna measuring 15x21 in., a common size, was compelled to absorb all the water which it was capable of lifting from a measured volume of the liquid. A reasonable amount of the loose water was permitted to run back into the measure, the kerchief being held meantime by two of its tips. The loss of water in the original receptacle was then measured. To keep on the safe side it is assumed that the kerchief water is wholly available for inspiration, that it does not evaporate, is not absorbed by the person of the wearer and does not seep out later on. The amount of water engaged by the bandanna under such assumptions is 5 cubic inches.

We assume that the air is vitiated by 10 per cent. of CO_2 , or 10 per cent. of CO, not an unreasonable amount, for the percentages might be well imagined nearly doubled without improbability. We assume moreover, that the temperature is 104 deg. F. The normal inspiration as stated by J. S. Haldane, is 432 cu.in. per min. This figure for inspiration is also assumed correct, although Doctor Haldane states that during muscular exertion, the volume of air breathed may be 6 or 8 times as much as during rest. Thus in one second 0.72 cu.in. of CO_2 and an equal volume of CO would be inspired. From these facts the table following is made up, the coefficients of absorption used being those of gas at 104 deg. F.

TIME OF GAS SATURATION
OF WET BANDANNA

Gas	Coefficient of Absorption	Cubic Centimeters of Gas Absorbed by Kerchief	Time for Complete Saturation Secs.
CO_2	0.506 0.018	2.53 0.09	3.51 0.12

It is clear that the handkerchief does more than dissolve the gases mentioned, because if that was all it accomplished, it could only serve a fleeting purpose.

EXAMINATION QUESTIONS and ANSWERS

To Encourage, Assist, and Instruct Those Preparing for Firebosses, Mine Foremen, and Inspectors Examinations, Selected and Original Questions Are Carefully Answered And Fully Explained

Some Recent Utah Mine Foreman Examination Questions

MINING BOOKS AND MAGAZINES FOR MINE FOREMEN

Ques.—Do you receive and read any instructive literature pertaining to the various systems of mining coal, and explaining points relating to the safety of operating mines?

[COAL AGE congratulates the Utah board of examiners upon its expressed desire to know how much effort candidates for examination are making to inform themselves on matters pertaining to the mining of coal and the safe operation of mines, by reading mining books and magazines. There is nothing better for gaining such information than a good, technical mining weekly.—EDITOR.]

FIRST-AID METHODS

Ques.—What is the correct method of procedure in regard to the first-aid treatment to be given persons injured and suffering from (a) burns; (b) electric shock; (c) broken limbs; (d) bleeding from cuts or wounds; (e) being overcome with gas? Explain fully.

Ans.—In all cases, keep cool; send promptly for a physician and, when possible to do so without danger, remove the sufferer to a quiet place and good air.

TREATMENT OF BURNS

(a) Remove clothing from the burned parts by cutting away the cloth carefully; and quickly cover the burned surface with light, soft linen or a layer of absorbent cotton to exclude the air. If possible, moisten the parts burned with a warm solution of common baking soda, or an emulsion of boiled (linseed) oil and limewater. Uncover but a small portion of the burn at one time. Do not expose to heat, and protect from dirt.

TREATMENT OF ELECTRIC SHOCK

(b) A brief contact with, say a 250-volt current, may give a severe shock to the nervous system that will pass off shortly. A more prolonged contact produces unconsciousness or death, depending on the individual, the quantity of current and its passage through the body. A strong man may resist successfully a current that would be certain death to a man with weak heart or nerves. If the current passes through the body its effect is greater than that produced by the

passage of the same current through the legs only.

Shut off the current, cut the wire, or by any means remove the person from the contact as quickly as possible. It may be possible to short-circuit the current and blow out a fuse. To remove a person from contact, a kick is often safer, because the current then only passes from one leg to the other, instead of through the body. Stand on a dry board or paper; if at hand, use rubber shoes or gloves, or both. Act quickly; a few seconds may prove fatal.

When contact is broken, lay person on his back; loosen the clothing about the neck, chest and waist; give plenty of fresh air; but avoid cool drafts, as the body should be kept warm.

If respiration has ceased, artificial respiration must be begun by drawing the tongue forward with handkerchief so that it will not obstruct the windpipe, and kneeling at the patient's head raise his arms first straight above his head; then throw them forward, bending the elbows and pressing the arms firmly against the sides and chest, to expel air from the lungs. Continue to work the arms, in this manner, forward and back, as a bellows, till natural breathing is restored. If the heart has ceased to beat, sometimes a sudden rap on the left chest will start its action, which must be done promptly or death is certain.

In all cases where artificial respiration is used, efforts to restore the patient to consciousness should not be discontinued till after a long time and when every possible means has been exhausted.

TREATMENT OF BROKEN BONES

(c) Move the patient with great care to as comfortable a position as possible, but do not attempt to carry him far if the fracture is painful or the bone is broken badly in one or more places. If the limbs are broken bind them together or to the body in such a way that the removal of the patient to a more desirable place will not aggravate the trouble. If necessary to remove clothing cut it away and do not pull it off. It will often be necessary to improvise a stretcher by running two long drills through the arms of two or more coats; or to bind the patient firmly and carefully to a brattice board or to two lengths of tracking tied together. Every move must be made gently. Then remove the sufferer to where he can be treated by a physician. Do not attempt to set a bone, but only make the patient as comfortable as possible till a physician arrives.

TO ARREST BLEEDING FROM CUTS OR WOUNDS

(d) Lay patient down, generally on his back, and elevate, as far as can be done, the limb or part of body from which the blood is flowing. Apply pressure to the bleeding parts, with the thumb and fingers; or by a knotted bandage, the knot being arranged to press the wounded part so as to impede and stop the flow of blood. If the blood is a bright red and spurts more or less from the wound, an artery has been severed, and the pressure must be applied to the blood vessel somewhere between the wound and the heart. Venous blood flowing from a vein is a darker color and wells up or flows steadily from the wound.

Keep the body warm, if necessary using hot-water bags or compresses; but in severe bleeding it is often necessary to apply ice or a cold iron immediately over the wound, to assist the coagulation of the blood.

TREATMENT OF A PERSON OVERCOME WITH GAS

(e) Remove the patient speedily to fresh air. If unconscious, keep body warm; dash cold water over face, from side, so as not to obstruct the nose. If necessary, employ artificial respiration to restore breathing. Give no stimulants; but peroxide of hydrogen, diluted with an equal quantity of water, is beneficial if the gas inhaled is carbon monoxide (CO). Rub the limbs upward briskly, to assist the flow of venous blood back to the heart and induce circulation. The inhalation of oxygen is always used with good effect to drive the poisonous gas from the lungs.

Every mine of any considerable size should have a well equipped hospital. The hospital should be convenient to the workings and not too far from the shaft. It should be well ventilated and oxygen tanks should always be kept on hand ready for use.

COMBUSTIBLE MATERIAL IN MINE ENTRIES

Ques.—What should be done with torn, unused brattice cloth found lying in the entries or the workings of a mine?

Ans.—Brattice cloth and all other combustible material not in use should be removed from the mine, if it cannot be used again. If it is good for further service it should be stored in a suitable place either in a mine shanty or a storeroom on the surface. It should not be allowed to accumulate in the entries or other parts of the mine.

COAL and COKE NEWS

Editorial Correspondence from our own Representatives in Various Important Mining Centers, and a Record of Legislative and Other Action Affecting the Coal Industry

Washington, D. C.

Representative Palmer has introduced a bill revising the Bureau of Mines Act which has been referred to the House Committee on Mines and Mining. In this it is proposed to amend section 2 of the act to read as follows:

"It shall be the province and duty of said bureau and its director, under the direction of the Secretary of the Interior, to make diligent investigation of the methods of mining and quarrying in slate, cement rock, granite, and other quarries, especially in relation to the safety of miners and other operatives, and the appliances best adapted to prevent accidents, the possible improvement of conditions under which mining and quarrying operations are carried on, the treatment of ores and other mineral substances, the use of explosives and electricity, the prevention of accidents, and other inquiries and technologic investigations pertinent to said industries, and from time to time make such public reports of the work, investigations, and information obtained as the Secretary of said department may direct, with the recommendations of such bureau."

SEGREGATED COAL AND ASPHALT LANDS

Representative Carter has offered a bill to provide for the sale of the surface of the segregated coal and asphalt lands of the Choctaw and Chickasaw nations and for other purposes. In this it is provided that there shall be an appraisal of the lands. Section 1 specifies that "the coal or asphalt deposits in each lease shall be appraised separately from the surface" and "the unleased coal and asphalt deposits shall be appraised separately from the surface according to the tracts used by the United States Geological Survey."

It is further provided that each holder of a coal or asphalt lease shall have the right to purchase at the appraised value a sufficient amount of the surface covered by his lease to embrace improvements, up to a maximum of 10 per cent. of such surface, subject to certain conditions and the approval of the Secretary of the Interior.

The methods of entering upon the lands for the purpose of prospecting are described and section 5 of the bill directs that the sale shall be carried on at public auction. The sum of \$50,000 is appropriated for expenses.

DOMESTIC COAL LOCATIONS IN ALASKA

Senator LaFollette has offered a new bill (Senate No. 3124) in which he proposes to amend the bill of the same number already introduced for the purpose of regulating the leasing of coal and coal lands in the territory of Alaska, which he presented last session.

The bill is of considerable importance because it indicates a decided change in the program of the progressive group in Congress with reference to the treatment of the Alaska coal lands. The new bill proposes to strike out section 8 of the measure already proposed and provide that any citizen of the United States duly qualified may, under the same conditions as in the case of placer claims "secure a domestic coal location for a period of ten years and no longer, which location shall give a right to the exclusive possession for coal-mining purposes only of a rectangular area of unappropriated public coal land in Alaska not exceeding ten acres in area nor larger than a square of ten acres in any dimension.

"A domestic coal location shall not be staked or recorded except by the locator in person, and shall not be sold, leased, hypothecated, or otherwise disposed of. The coal mined from any such location shall not exceed 2000 tons in any one year, shall be subject to no royalty, and shall not be exported from Alaska. Domestic coal locations may be made immediately upon the passage of this act, notwithstanding any existing withdrawal of coal lands, but subsequent withdrawals shall be effective as against such locations, unless the same shall be specifically expected therefrom."

GOVERNMENT RAILROAD FOR ALASKA

A new section, also to be added to the bill, reads in part as follows:

"The President shall cause the construction and operation of a railroad from the Matanuska or Bering River coal fields in Alaska to the coast. The Secretary of War is hereby directed without delay to examine all existing surveys for railroads from the Matanuska and Bering River coal fields in Alaska to the coast, and if it shall appear that the probable cost of constructing a coal-carrying railroad from one of said coal fields to a harbor open all of the year is less than half the probable cost from the other of said fields to such a harbor, then the Secretary of War shall proceed forth-

with to locate a railroad on the best practicable line along or near the route so determined to be less costly."

Alabama

Birmingham—A decree was recently rendered by Judge W. I. Grubb, denying the petition of the St. Louis Trust Co., as trustee for the J. H. Mudd estate, for an injunction to terminate the lease of the Galloway Coal Co. and restrain the company from operating its mines on certain lands in Bibb County. It is reported that the Galloway company contemplates making various improvements on the Bibb County coal lands, which improvements will probably be carried forward now that the suit over the land has been settled.

The new byproduct coke ovens of the Tennessee Coal, Iron & R.R. Co. are nearing completion. It is intended to fire the first battery of these ovens early in January.

Gadsden—The property of the Raccoon Mining Co. at Altoona, will be put in operation, after a long shutdown. About 100 men will be employed.

Colorado

Denver—The Colorado coal fields are now the only coal-mining districts in this country or Canada where labor troubles of any magnitude remain unsettled. Although the mines in both the Northern and Southern fields continue in operation, the condition in the former is one of suspended hostilities and in the latter field it is reported that a strike is imminent. The operators of northern Colorado openly charge Gov. Shafroth with favoring the cause of the strikers and neglecting to take proper measures to secure the peaceful and unmolested operation of their mines. In the Southern field, the report of a commission appointed by the governor, which shows the men to be losing 2½c. per ton on an average because of the change from a lump-coal to a run-of-mine basis of payment, has revived the dispute which caused the threatened strike of 1000 employees of the Colorado Fuel & Iron Co., last October. Although not previously a union field, it is reported that the men have recently become generally organized and a strike involving perhaps 20,000 workers is probable.

Agitation by the Denver Chamber of Commerce directed toward securing a

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lower price for coal and recommending the operation of mines by the state, has elicited from President Evans, of the American Fuel Co., an offer to sell that company's property to the state at 50c. on the dollar. Mr. Evans is so strongly of the opinion that coal cannot be produced and sold more cheaply than it is at present that he declares that this offer is made in perfectly good faith and stands.

Illinois

Chicago—An executive meeting of the coal-mine operators of the Illinois and Indiana coal fields was held in Chicago, Dec. 14. The meeting was for the purpose of conferring with the Ohio and Pennsylvania operators, but it was unofficially declared that the latter delegations had not arrived, it being said that these two states are opposed to entering into an agreement. Another meeting was arranged for, to be held in Columbus, Ohio, within 10 days.

Isaac A. Smith, who is interested in the proposed Springfield & Central Illinois Traction Co., reports that it is probable that the proposition as outlined, which is to connect with several mines in the central Illinois field, will go through within a short time.

Taylorville—The Peabody Coal Co. is developing three mines, in the vicinity of Taylorville and Kinkaid. Work on all three is now reported to be in progress. It is understood that a large central electric plant will be located at Kinkaid.

Marion—A charter has been granted to the Johnson City Connecting Railway Co. It is proposed to construct a railroad in Williamson County, connecting several of the mines in the vicinity of Johnson City and Marion.

Indiana

Indianapolis—Chairman Wood, of the state railroad commission, has issued an order amending the car demurrage rules to except from demurrage the cars loaded with coal or coke and awaiting transportation at the mines or coke ovens. Before the amendment, only those cars at the mines or ovens which were waiting to be loaded were excepted. The order, which was made without objection by any of the roads, was asked for by the Vandalia Railroad Company.

Members of the United Mine Workers of America balloted, Dec. 12, for their national officers. The most important contest was for the office of president, John P. White, of Oskaloosa, Iowa, being opposed for reelection by Thomas L. Lewis, of Bridgeport, Ohio, a former president of the organization. Edwin M. Perry, of Iowa, had no opposition for reelection as secretary-treasurer, but there was a large number of candidates for other offices. The results will not be officially

announced until the convention in January.

Terre Haute—The formation of a national federation of bituminous coal operators is understood here to be an assured fact. The appointment of a committee on organization and constitution at a recent meeting has been announced. Philip H. Penna, secretary of the Indiana Bituminous Operators' Association, said that the national organization had been in the course of formation for several years, and that final steps were taken last week at Chicago. Mr. Penna said that assurances have been received that every coal-producing state in the Union will be represented.

Kentucky

Louisville—The Elkhorn coal field is to have another railroad, one with an eastern and southeastern outlet. The Carolina, Clinchfield & Ohio will start from St. Paul on its main line in Wise County, and pass through Coeburn, Norton, Glamorgan, and the Pound section in the Virginia coal fields; through Pound Gap on the state border by a short tunnel, and so on to Jenkins, connecting there with the Big Sandy & Elkhorn, a branch of the Chesapeake & Ohio, now being rapidly constructed into Jenkins.

At the midwinter meeting of the Kentucky Mining Institute, held at Lexington, Dec. 11, a number of owners, managers and general superintendents of coal mines were present. Vice-president R. B. Hutchcraft presided. Appropriate resolutions regarding the death of President Atkinson were adopted. A number of papers, dealing with the practical operation of mines, were read and discussed.

If the plans of Eastern capitalists, headed by Gen. T. Coleman Du Pont, of Wilmington, Del., who are conferring with the owners of several coal mines in southwestern Kentucky, go through, a coal merger, estimated to involve \$10,000,000, will be completed. The coal companies to be taken over are the W. G. Duncan Co., the Powderly Coal Co., the Lam Coal Co., the Wickliffe Coal Co. and the Memphis & Broadway Coal Co. According to the terms of the consolidation, the control must pass from the Kentucky operators to the Eastern capitalists.

Missouri

St. Louis—The top works of the mine of the Northern Central Coal Co., at Higbee, were destroyed by fire on the night of Dec. 12. The output of this mine was largely contracted to the Chicago & Alton for company fuel.

The St. Louis Coal and Coke Company has been incorporated for \$50,000. It will handle the output of the Colp Mine at Pittsburg, Ill., the Gent Coal Company's mine near Marion, and the Galatia Coal Company's mine at Galatia.

Nevada

Goldfield—Great interest is being manifested in the development of the coal mine at Coaldale, 60 miles north of here. An analysis of several samples of the coal shows it to contain about 50 per cent. fixed carbon and 33 per cent. volatile matter. The property is being worked by a slope 150 ft. long which taps the coal at a depth of 80 ft. below the surface, the seam varying from 8 to 11 ft. in thickness. Indications are that the deposit covers a considerable area and it is thought probable that the Tonopah & Goldfield R.R. will build a spur to the property.

Ohio

Cleveland—It is understood here that the proposed \$30,000,000 coal merger in No. 8 field, Ohio, is likely to prove a failure on account of the Ohio anti-trust laws and other unexpected obstacles. W. F. Kann, of Pittsburgh, is representing the operators and F. J. Lismann & Co., of New York, are in charge of the financing. The company was to have issued \$10,000,000 preferred stock, \$5,000,000 common stock and \$15,000,000 bonds.

Columbus—The Eastern Ohio Coal Operators' Association appeared before the Interstate Commerce Commission, Dec. 13, against the Wheeling & Lake Erie, the Baltimore & Ohio, and the Pennsylvania Lines West of Pittsburgh, charging that the rates on coal from the mines in eastern Ohio to Lake Erie ports are unjust and discriminatory. The present rate is 85c. a ton on all three roads and the association, which is composed of 40 individual operators, is willing to leave the commission to decide on what it considers a fair rate.

The Black Top mine, in the Crooksville field, will not be reopened until after Jan. 15, if then, according to State Mine Inspector Harrison, who recently inspected the mine. A portion of the mine was sealed up after a recent fire, and samples of air taken through tubes inserted in the wall show the presence of considerable gas.

Toledo—By the terms of two decisions handed down by United States Judge John M. Killits, Dec. 9, the Hocking Valley R.R. Co. must answer to indictments of having granted rebates to the Sunday Creek Coal Co., and the latter concern must stand trial on the charge of having received rebates. The summary of the opinion is that the granting of unlimited credit by the issuance of notes to guarantee freight charges is a violation of the Elkins anti-rebate law, and both the grantor and the firm accepting rebates are guilty.

Cincinnati—Commencing Dec. 1 the Burlingham Coal Company, of this city, has secured control of the St. Clair col-

liery, at Eagle, W. Va. A new operation will be opened on the property, which is on the Chesapeake & Ohio railroad. Louis Watkinson remains as president of the company and will continue in charge of the operations.

Oregon

Portland—H. S. Brinley, of Portland, has taken a lease on an 8-ft. vein of bituminous coking coal recently uncovered on the property of the Benedictine Fathers, near Mount Angel, Oregon.

An important strike of bituminous coal is reported from the Rainy Hollow district near Haines, Alaska. The vein is said to extend across the British Columbia boundary.

Pennsylvania

BITUMINOUS

Westland—The Midland No. 3 mine of the Pittsburgh Coal Co., employing nearly 400 men, closed down, Nov. 29, for the winter. Some of the men are being employed at the Midland No. 1 and the Allison mines of the same company, while the others are being employed in the Ohio and West Virginia coal fields.

Pittsburg—Delegates from 45 branches attended the meeting, Dec. 14, of the River Coal Employees' Relief Association of the Monongahela River Consolidated Coal & Coke Co. The financial report of the association was read and officers elected for the ensuing year.

The Coal Mining Institute of America held its winter meeting in the quarters of the Engineers' Society of Western Pennsylvania, this city, Dec. 19 and 20. In addition to addresses by the presidents of the two organizations, eight interesting papers were presented.

Following a conference of coal operators and electrical experts with Chief Mine Inspector James E. Roderick, held recently at Pittsburg, Supt. W. R. Calverly, of the Berwind-White Coal Mining Co., has appointed a committee of mining and electrical engineers to agree upon a uniform system of indicating on maps electrical equipment used in the mines of the bituminous regions of western Pennsylvania.

It is announced that the West Penn Traction Co. will build a line connecting West Newton and Hunker, a distance of 10 miles. The company will then need but four more miles of road to give it a continuous right of way through the coke regions from McKeesport to Scott Haven.

Immediate improvement of the Allegheny River from its mouth to the Mahoning Creek, a distance of about 60 miles, by the construction of five locks and dams is the recommendation of Col. Newcomer, resident engineer at Pittsburg, to the chief of engineers, made public, Dec. 14. For this work it is es-

timated that an appropriation of \$2,500,000 will be required. The improvement of the Allegheny will have to wait specific appropriations, which may be included in the forthcoming river and harbor bill, or may be delayed in view of the already heavy appropriations for the Ohio.

ANTHRACITE

Scranton—The Carlton Coal & Mining Co., recently incorporated, is reported to have begun work at an abandoned property, leased from the Lackawanna company. There is still considerable coal in the old workings, including a large number of pillars. A small breaker has been erected.

Wilkes-Barre—The anthracite conciliation board met here, Dec. 11. The grievances of the employees of the Alden Coal Co. were taken up, and, with one or two exceptions, the miners were sustained in their complaints. The award is retroactive and means back pay for the men, dating from Aug. 1, 1911. Grievance No. 201, preferred against the Lehigh & Wilkes-Barre Coal Co., was continued over to the next meeting.

Two serious cavings of the surface occurred recently in this vicinity; one at Plains, where an important street crossing subsided about 2½ ft., and one at Court-dale, where the Kingston Coal Co. has recently expended a considerable sum to strengthen the mine workings against caving. In both instances a number of houses were disturbed and damaged.

Lansford—One of the largest operations in the anthracite field was started recently by the Lehigh Coal & Navigation Co., when a force of men began work on sinking a shaft which will eventually tap six veins of coal and mean the erection, near Hauto, of a mammoth new breaker.

It was announced, Dec. 12, that the Lehigh Coal & Navigation Co. will issue \$3,000,000 of collateral trust 4½ per cent. bonds for the purpose of financing an electric power plant, which will utilize waste coal. The new plant will be located near Hauto, about eight miles above Mauch Chunk, along the Nesquehoning Creek, and will involve the construction of a new dam to increase the capacity of an existing reservoir.

Shenandoah—The main steam pipe, 15 inches in diameter, that carries steam from 20 boilers at Maple Hill Colliery, exploded recently, demolishing the roof and one side of the boiler house. Three men barely escaped from being struck.

Tennessee

Knoxville—Frank White and others have purchased the leasehold and improvements on 800 acres of coal lands from the Valley Creek Coal Co. The property is on Clear Fork, adjoining that of the Pruden Coal & Coke Co. Mr.

White states that an organization will be perfected and the mines operated.

According to the latest available reports from Briceville, 46 bodies have so far been recovered in addition to the five men who were taken out alive from the Cross Mountain mine. Dr. J. A. Holmes has left the rescue work in charge of J. W. Paul and Dr. Rutledge.

Washington

Spokane—As the result of a decision recently handed down by the U. S. Supreme Court, which declares that a person or association is limited to one coal-land entry in Alaska, trials will be begun at the next term of the federal courts which may involve the title to lands valued at many million dollars.

The Northwest Coal Co., of North Yakima, is making preparations to develop a large bed of coal in the Taemun Creek basin. Charles Wickle is manager.

West Virginia

Welch—The grading for the new mining plant of the Pocahontas Consolidated Collieries Co., on the South Fork of the Tug River, is completed, and as soon as the railroad is laid to the mines, operation will be commenced.

The electric plant of the Pocahontas company, located at Switchback, which in addition to furnishing power for the Collieries plants, supplies the Appalachian Power Co., selling power to the towns of Pocahontas and Bramwell, will be increased to meet the new conditions. The Collieries Co., as well as the towns of Pocahontas, Bramwell and other towns and various coal plants, will eventually secure power from the Appalachian Power Co.'s hydro-electric plants which will be established as soon as the dams being erected by the company in Carroll and Grayson Counties are completed.

Canada

Alberta—The Superior Coal Co., capitalized at \$1,500,000, has been launched by B. K. Bullock, well known in coal-mining circles in this province. The property is situated 3½ miles from Tabor, just north of the Belly River. Development has been going on steadily for some time and already two tipplers have been erected, approximately one mile apart. An area of 5043 acres was purchased from Osler, Hammond & Nanton, of Winnipeg. The seam is 4 ft. 2½ in. thick, with a minimum of shale, making the work of mining a comparatively easy matter. A test of the coal shows it to contain 46 per cent. carbon.

Nova Scotia—The properties of the North Atlantic Collieries Co. were sold under execution at Sydney, Dec. 14, for \$70,500, to H. C. Foss. It is understood that they were purchased for Stone & Webster, of Boston, Mass.

Personals

Edward Savage, of Pittsburg, Penn., has succeeded Lowther Ferris as sales agent of the Carnegie Fuel Co., in Minnesota and Wisconsin.

George Z. Hosack has resigned as vice-president of the Pittsburg Coal Co., effective Dec. 31. Mr. Hosack will become president of a new company, known as the Cross Creek Coal Company.

J. G. Skidmore, of the Madison Coal Corporation, has been elected president of the St. Louis Coal Club, a recently organized association of coal men in and about St. Louis. A. A. Bryden, Borders Coal Co., is vice-president and E. J. Wallace, Mississippi Valley Fuel Co., is secretary and treasurer.

F. E. Doubleday, general manager of mines for the Central Coal & Coke Co., Pittsburg, Kan., has resigned, effective Dec. 1. He has been succeeded by William McKinley, who has been a superintendent of mines for the company for a number of years, most of the time in the vicinity of Huntington, Arkansas.

H. S. Geismer, who was recently appointed one of the receivers of the Chattanooga Iron & Coal Co., is a member of the Keiser-Geismer Engineering Co., of Birmingham, Ala., and until lately was superintendent of the Tennessee division of the Southern Iron & Steel Co., operating the Chattanooga furnace and the Dunlap mines.

Capt. W. A. May has been elected vice-president and general manager of the various coal companies controlled by the Erie. These are the Pennsylvania Coal Co., the Hillside Coal & Iron Co., the Northwestern Mining & Exchange Co. and the Blossburg Coal Co. Since the Erie took possession of the Pennsylvania Coal Co., Capt. May has been acting as general manager.

Obituary

David W. Howie, Sr., aged 69 years, died suddenly Dec. 7, at the home of his daughter in Milwaukee, Wis. Mr. Howie was prominently identified with the Milwaukee coal trade, having been a coal dealer in that city for the past 30 years.

Hugh Coll, for many years superintendent in charge of water supply for the H. C. Frick Coke Co., died Nov. 29, at Easton, Md., after a brief illness from typhoid fever. Mr. Coll was a member of the Frick Veterans' Association.

Col. J. B. Stephenson died at his home, in Roanoke, Va., Dec. 5. Of late years Col. Stephenson had not participated actively in business. He was a man of considerable wealth, having invested a number of years ago in coal lands, which have since become the property of the Pocahontas companies, and have yielded a large revenue.

Construction News

Myersdale, Penn.—Frank B. Black and associates have purchased a large tract of coal land lying on the Negro mountain ridge between Garrett and Wilson Creek, with a view to beginning operations in the near future.

Birmingham, Ala.—It is reported that certain improvements which the Gallo- way Coal Co. have contemplated making on their property in Bibb County will probably be carried forward now that litigation in regard to the lease has been settled.

Knoxville, Tenn.—The Southern Mining Co., Williamsburg, Ky., which recently leased the operations and coal-land holdings of the Asher Coal Mining Co., of Wasiota, Ky., is said to contemplate spending about \$500,000 in developing and equipping the mines.

Blairsville, Penn.—W. P. Graff, R. M. Smith and associates, of Blairsville, have purchased a 250-acre tract of coal land from the Isabelle Furnace Co. and will immediately make preparations to mine coal. This is a Cokeville operation which the steel corporation shut down about 10 years ago.

Somerset, Penn.—The Quemahoning Creek Coal Co., Charles J. Harrison, Somerset, president, is opening a new mine between Somerset and Jenners. The company will erect an up-to-date tipple and install electric mining machinery. Thomas Daly, of Grafton, W. Va., is consulting engineer in charge of construction.

Norfolk, Virginia—It may be stated positively that both the Norfolk & Western and Chesapeake & Ohio railways will build this year new coal piers, modeled after the Virginia Ry. pier, but embodying such changes and improvements as may seem advisable. Both of these new piers will be used exclusively for loading steamships and will add greatly to the dumping facilities at Hampton Roads. It is expected that arrangements will be made at the new piers to prevent the excessive breakage of the coal, which is one of the chief objections to the old style piers.

Recent Incorporations

Kentucky—The Clover Fork Coal Co., of Harlan; capital \$50,000. In corporators: A. F. Whitfield, Cyrus Whitfield and B. W. Whitfield.

Arkansas—The Hartford Smokeless Coal Co., of Little Rock, capital stock \$6000: Incorporators: C. B. Blackburn, John W. Tyler and O. C. Hansen.

Texas—The Southwestern Fuel Co. of Fort Worth; capital stock, \$60,000. In corporators: Herman L. Smith, Thomas D. Ross and Francis A. Douglass.

West Virginia—The Jolliffe Coal & Coke Co., of Fairmont, capital \$150,000,

has been chartered to operate in the Lincoln district of Marion county. The incorporators are Jacob S. Hayden, M. A. Jolliffe and associates, all of Fairmont, W. Va.

The Gascoaloil Co., of Charleston; capital \$25,000; to deal in and develop mineral lands in the Big Sandy district of Kanawha County. Incorporators: D. B. Brawley, D. A. Brawley, W. B. Brawley, H. D. Brawley and R. M. Brawley, all of Charleston.

The Spruce Fork Coal Co., of Charles- ton; capital \$400,000 to do a general coal-mining business, operate byproduct plants, cut timber and manufacture lumber in Logan County. Incorporators: William M. Humphreys, Jr., J. Keating Willcox, J. L. Montgomery, Frank L. Whitley and T. Truxton Stiles, Jr., all of Philadelphia, Penn.

Columbus, Ohio—The Hemlock Co., of Columbus; capital, \$50,000; to mine and sell coal and prospect for oil. Incorporators: N. C. L. Kachelmacher, R. A. Magly, F. R. Anderson, C. B. Donahue and M. Burke.

Industrial Notes

Brown Brothers, of Elmira, N. Y., es- tablished for 18 years in the woodworking industry, announce a wood-pipe de- partment equipped with every modern device. Max M. Brown, widely known in the coal industry, will be in charge of the field sales work, assisted by Col. Archie E. Baxter, Benj. B. and Paul B. Brown. J. C. Brown, inventor of various types of woodworking machinery, will handle the producing end. High class stock and extra lengths will be specialties of the new pipe-manufacturing department of this concern.

The Ottumwa Box Car Loader Co., of Ottumwa, Iowa, has completed the building of a modern coal-mining plant at the Acme property of the Acme Coal Co., Sheridan, Wyo. This plant is one of the largest and most up-to-date installations west of the Mississippi River. It consists, in part, of a steel tipple containing shaker screens, automatic feeds, weigh pans, scales, etc., which prepares four sizes of coal for loading directly onto railroad tracks. The mine cars are brought to the tipple from the mine level on a steel approach and are handled by a modern car-haulage system. When market conditions so require, all sizes of coal, except lump, are carried from the tipple to a rescreen house by means of a 30-in. belt conveyor supported on steel trusses. The rescreen house is equipped with a revolving screen for preparing five sizes of coal, which are deposited in large steel bins for loading out on the three railroad tracks and at both sides of the building. The slack size of coal is carried by means of a conveyor to the power plant, which is located near-by.

COAL TRADE REVIEWS

Current Prices of Coal and Coke and Market Conditions in the Important Centers

General Review

While there is no decided improvement over the depressed condition of the market last week, most reports are more optimistic, and indicate a general steady-up in trade. Weather conditions still continue adverse for domestic, while on the other hand encouraging reports from industrial centers, especially in steel, are having a noticeably stimulating effect on the steam fuels.

Conditions on the Atlantic Coast are about normal and supplies good, although water freights continue high. There is a perceptible absence of new business, but the contract tonnage is heavy and there is no coal on demurrage. At Pittsburgh domestic has fallen off, but steam continues good, and reports for November show a heavier tonnage moved all-rail than last year. It is believed there that stocking in anticipation of the coming wage conference will begin after the first of the year.

Trade in Ohio is quiet, but prices are firm. The weather has been warm and supplies are large, but steam is considered normal for this period. In states to the south conditions do not appear so favorable, and there is still evidence of a demoralized market.

A free supply of cars in the Middle West has resulted in overshipping the market, and conditions there are probably the worst in the country. Prices have slumped in some instances to the lowest point in a number of years, and the only chance for improvement in evidence is the resumption of a number of the large steel plants.

Mines in the Rocky Mountain states are mostly working full time, while on the Pacific Coast the weather is mild and trade continues normal or quiet.

Boston, Mass.

With colder weather, and a northeast storm preventing the movement of transportation, the situation is rather firmer than a week ago. A shortage of labor is rumored in the West Virginia fields, and receipts at the loading piers are beginning to be light. The arrivals of off-shore tonnage are understood to be more than usual, and no one here would be surprised to see a material advance in f.o.b. prices before the holidays are over. It is stated \$2.70 and \$2.75 have already been quoted for spot shipment at Hampton Roads. Mystic Wharf prices, on cars,

Boston, are practically at the same level as for a fortnight past, namely, around \$4, although during the very mild spell 10 days ago, alongside prices for cargo lots were decidedly weaker.

On Georges Creek and the Pennsylvania soft coals at tidewater, there is no apparent change. Barges are still moving slowly, and have to be arranged for well ahead of requirements. Some of the better brands from Somerset County are netting \$1.30@1.35, at the mines, a higher level than has obtained for some time.

The supply of tonnage is still behind the demand, and while the \$1.15 rate was said to be had during the soft period last week, rates are now supposed to be back at \$1.25 for the larger vessels, Norfolk and Newport News to Boston.

New York

The bituminous market here at New York has held its own this week. While there has been only a small amount of new business coming in, contract demand has been steady and quite ample for the prompt disposition of arriving and standing tonnage at the New York piers. It is likely that shipments to New York tide-water are not relatively so heavy as a few months ago because now the demand from rail points is so large and absorbs such a big percentage of the production that the shipments which are being made to this market, are not much greater than the present needs. Nevertheless there is a large tonnage moving, as is evidenced by the fact that all of the New York piers have been extremely busy this week, dumping up to a large percentage of their capacity.

The mines supplying this market with steam coal are practically all working full time and it is interesting to note, notwithstanding this, the absence from this market, for the moment, of demurrage coal.

Shortage of marine transportation continues to be a source of worry to the coal trade and the markets in the East along the Sound would no doubt readily take up a larger tonnage, were boats for this trade more plentiful, but the weather has again been adverse to the prompt movement of tugs.

Spot prices are not much changed; the bulk of the business now moving is on contract so that there is not enough spot demand to cause any substantial advance in prices.

Philadelphia, Penn.

The milder weather that has been prevailing in this vicinity opened the present week, although predictions are that there is likely to be cold weather and snow before the close of the week, and that snow-covered ground may be expected for the holidays.

Another week has passed, and yet no indications of a depression in the wholesale market. This is particularly true of the tidewater market, where all sizes are in much demand. Vessels are held up, awaiting the arrival of certain sizes of coal from the mines, especially stove and chestnut, and the relief that would naturally be expected from the slump in the local market, is not evident, although in a measure assisting somewhat.

The bituminous market still continues its on and off policy. Some of the operators approached state that business is fairly good, and others are down in the mouth, but still continue hopeful. High rates of freight at tidewater have had the effect of curtailing considerable tonnage that would otherwise go in this direction. As high as \$1.25 to Boston has been asked and paid.

Pittsburg

Bituminous—Domestic demand, which was quite good, fell off somewhat last week, but is expected to prove better this week. Manufacturing demand is good. There has not been a great deal of stocking yet, but a decided movement in this direction is expected, after the first of the year, in anticipation of a suspension after the present wage scale expires, Apr. 1. The strength of the general demand is shown by the fact that the leading interest in this district, disregarding shipments in the Lake trade, shipped more coal in November than in the corresponding month of last year. Prices are a trifle firmer in the past fortnight, by about 5c. a ton, and we advance quotations on nut, mine-run and 3/4-in. by 5c. a ton and on 1 1/4-in. by 10c., quoting slack at 70@75c., against 65@75c., as follows: Nut, \$1.05@1.10; mine-run, \$1.10@1.15; 3/4-in., \$1.20@1.25; 1 1/4-in., \$1.35@1.40; slack, 70@75c. per ton at mine, Pittsburg district. These prices apply on ordinary sales, but are occasionally shaded on odd lots which have to be moved.

Connellsville Coke—A little additional contracting for furnace coke for deliv-

ery in the new year has been done, and probably three-fourths of all the furnace coke to be covered at this time is now closed. This reckoning does not include cases in which furnaces not now provided with contracts may blow in, if the present improvement in the iron and steel industry continues for any length of time. Spot furnace coke continues very stiff and it is not easy to pick up any considerable tonnage at \$1.60, the advance price quoted last week, while there are predictions the spot market will reach \$1.70 before the end of the year. This, however, represents merely the usual movement at this time, and the market may be back to \$1.50 in January unless general conditions have meanwhile improved. We continue to quote: Spot furnace, \$1.60@1.65; contract furnace, first half, \$1.60@1.65; year 1912, \$1.65@\$1.75; prompt foundry, \$1.80@1.90; contract foundry, \$2@2.25, per ton at ovens.

The *Courier* reports production in the Connellsburg and lower Connellsburg region in the week ending Dec. 9 at 319,130 tons, an increase of 3000 tons, and shipments at 3490 cars to Pittsburg, 4937 cars to points west and 1092 cars to points east, a total of 9519 cars, or 67 cars more than in the preceding week.

Baltimore, Md.

Warm weather conditions had a depressing effect on the Baltimore market during the week and, viewed as a whole, there was little to encourage the trade here. There has been an entire absence of seasonable weather for five days or more, and the high temperature has practically eliminated any signs of spot business, which proves quite profitable to operators, when the market is active.

A considerable tonnage moved from the mines in Maryland, West Virginia and other states, but it was shipped under contract, and this movement had little or no effect on the market, especially so far as prices were concerned.

What few sales were recorded outside of contract shipments throughout the week were for steam coal. The gas-coal market was absolutely stagnant.

Buffalo, N. Y.

The coal trade is still badly affected by the weather, even bituminous suffering severely, on account of its large use in the heating of office buildings, which have required little fuel as the thermometer has scarcely been down to freezing for 10 days. Still, considering the quiet state of the trade during the fall, the demand has been fair and promises to continue so.

With the return of seasonable weather there is every promise of a good general

coal trade, although the stir is not expected to be sufficient to advance prices.

As a rule the mines in the bituminous regions are running on practically full time and there is no coal accumulating on track except where the railroads are failing to keep up with their work, which is reported in a few instances.

Bituminous prices are as formerly, with some added stiffness: \$2.50 for Pittsburg three-quarter, \$2.40 for mine-run and \$2 for slack, with coke about the same, at \$4.25 for best foundry, to \$3.50 for stock coke.

Anthracite is suffering severely from warm weather. But for the great call for it through the fall the trade would be in poor condition. Lake shipments for the season have ceased, being 3,919,429 tons, as against 3,639,368 tons for 1910.

Cleveland, Ohio

According to reports, coal is moving pretty freely from the upper lake ports. Many of the vessels that are laid up at Fort William and Port Arthur are under charter, but at Duluth, where the fleet is much larger, only a few steamers have been tied up.

The steam trade does not show any great improvement as to demand or prices, excepting in slack. Youghiogheny slack coal has been plentiful with prices stiff. The domestic trade is slack on account of the extremely mild weather the past two weeks, but, according to weather reports, we are expecting a cold wave.

Prices in Ohio fields are: No. 8 slack, 75c.; mine-run, 90@95c.; 3/4-in., \$1@1.05; 1 1/4-in., \$1.10@1.15; Middle district: slack, 75@80c.; mine-run, \$1.05@1.10; 3/4-in., \$1.15@1.20; 1 1/4-in., \$1.40@1.45; Pocahontas, mine-run, \$1.10@1.15; lump, \$2.15@2.20.

Columbus, Ohio

Continued warm and rainy weather has caused a let up in orders in the domestic trade and on the whole the market in the Buckeye State has been quiet. Another cause for the slack demand is the approach of the holidays, which is usually a signal for a falling off in orders from the consumer.

Prices are still fairly well maintained at the circular figures issued in September. There is no disposition as yet to advance the circular quotations, although there was some talk recently that an advance might be made some time in January.

Prices are ruling rather firm in all grades despite the weather conditions. In the steam trade the requisitions are coming up to the usual amount for the time of the year, although some slowness is reported in certain lines of manufacturing. The railroads are taking a larger

amount of steam grades and in some cases there is a disposition to store in anticipation of a suspension.

Operations in Ohio fields have not been active lately because of the slackness in the domestic trade. In the Hocking Valley fields the output has been about 70 per cent. of the average and the same percentage prevails in the Jackson, Masillon and Cambridge fields. In the Pomeroy Bend field the output has been slightly larger. In eastern Ohio the production is also curtailed considerably because of the general softness of the trade.

Prices prevailing in Ohio fields are:

Domestic lump in the Hocking Valley	\$1.50
Domestic lump in Pomeroy Bend district	1.60@1.75
Fancy grades of domestic coal	1.85@2.35
Three-quarter inch	1.35
Nut	1.15
Mine-run in eastern Ohio	0.95@1.05
Mine-run in the Hocking Valley	1.05@1.15
Coarse slack	0.35@0.45
Nut, pea and slack	0.40@0.50

Cincinnati, Ohio

Three weeks ago the car situation was so tense that coke racks were used to transport lump coal, while today it is just the reverse, and cars of all kinds and in any quantity desired are readily supplied. Unseasonably warm weather has prevailed for two weeks and the demand for both lump and steam coal is consequently much less. Wholesalers, holding contracts calling for a specified delivery, are being asked to delay as much as possible.

While the wholesalers and operators are accommodating their customers in this matter they are doing so at a distinct inconvenience to themselves. The request comes just at the time when the mines are turning out the maximum output per day, due to the fact that the miners are endeavoring to increase their Christmas pay checks.

There is probably more fuel being sold on demurrage here than for some time. The Northern markets consumed a part of it for a time but even that has fallen off so that there is not much relief now. In all cases, however, it is not believed that the sales have been of sufficient importance to interfere with the general level of prices.

Charleston, W. Va.

As far as output is concerned, there has been little or no change in this state during the past week over that of the previous week. There has, however, been some increase in price, which will insure the continuation of a number of operations that would otherwise have soon been compelled to close down.

The Smokeless Coal Association, which has had several meetings during the past few months, held one, last week, in Philadelphia, at which 98 per cent. of the

smokeless-coal operators on the Chesapeake & Ohio, the Norfolk & Western and the Virginia railways were represented. It was agreed among them that their future success depended upon the securing of a better price for their coal, and in order to secure the continuation of operations of many of the mines, the price of smokeless was advanced 10c. a ton. This, of course, applied to run-of-mine and tidewater shipments, which will net the operators \$1.20 from the New River, Kanawha and Pocahontas fields, making all contracts hereafter \$2.70 at tidewater.

Hampton Roads, Va.

Business at the Hampton Roads ports has been quite good during the past week. Notwithstanding the high coastwise and foreign steamship rates, several of the large shippers have been short of coal and compelled to buy from other agencies.

Prices are firm and fairly well maintained and there is a tendency for the coal operators and sales agencies to work together as regards both sales and prices. This is a different state of affairs from that which has obtained during the past year. The export business is growing in volume every month and will certainly be at its greatest during 1912. Several contracts have been made for foreign shipments, principally to South America and the Mediterranean ports, beginning Jan. 1.

Louisville, Ky.

A period of warm, rainy weather, combined with the approach of Christmas, has caused a slump in the local retail trade, and the dealers are loud in their complaints. Due to these conditions, the consumers are buying only what they actually require. There is plenty of coal available, both river and railroad, and the prices remain about as last week. Pittsburgh lump is being sold as low as \$3.50, and nut at \$3.25. These prices are on a cash basis, however, and are due to the rate war recently started. Straight Creek is being offered at \$3.75, and Jellico egg at \$3.60. Anthracite, broken, egg, stove, nut and chestnut are quoted at \$7.25 in carload lots, f.o.b. Louisville.

Wholesale prices are ranging as follows, f.o.b. mines: Straight Creek, block and lump, \$2; Rich Mountain, of Genuine Jellico, \$2.25; higher grades of nut and slack, 85c., and the cheaper grades, such as the Dean, 50@60 cents.

Nashville, Tenn.

Another week of warm and unseasonable weather finds the coal trade, as usual in this field, in a demoralized condition. While the operators are making a heroic effort to maintain prices on lump at \$1.50

per ton, and have been fairly successful in doing so, there is no demand for coal at any price. It is not a question of price; the dealers have no business, and consequently no use for coal. There has been little life to business this season and it will take more than a few days of cold weather to stimulate the demand.

Owing to the small amount of lump coal produced during the past 10 days, there has naturally been a small amount of screenings, but there seems to be little, if any, better demand than has existed during the entire fall, and the price is practically unchanged.

with the exception, of course, of anthracite and smokeless, and even screenings dropped off from 5c. to 10c. a ton in the face of what appeared to be a shortage on that size.

Several of the mines in the high-grade field, and also some in the Standard, have shut down until the demand gets better.

Franklin County coal under demurrage at East St. Louis sold for as low as \$1.25, and Carterville lump and egg under demurrage has been selling as low as \$1.15. Carterville mine-run under demurrage has been offered at 85c., and Standard mine-run at 72½c. The prevailing prices are:

<i>Franklin County</i>	
Lump and egg.....	\$1.40@1.50
No. 1 nut.....	1.25@1.35
No. 2 nut.....	1.15@1.25
No. 3 nut.....	1.00@1.10
2-in. screenings.....	0.65@0.75

<i>Carterville</i>	
6-in. lump.....	\$1.25@1.35
3x6-in. egg.....	1.20@1.30
No. 1 nut.....	1.15@1.20
No. 2 nut.....	1.00@1.10
No. 3 nut.....	1.00@1.05
2-in. screenings.....	0.55@0.65
Mine-run.....	0.95@1.00
No. 1 washed.....	1.50@1.60
No. 2 washed.....	1.20@1.30
No. 3 washed.....	1.15@1.25
No. 4 washed.....	0.80@0.90
No. 5 washed.....	0.40@0.50

<i>Standard</i>	
6-in. lump.....	\$0.90@1.00
2-in. lump.....	0.85@0.95
3x6-in. egg.....	0.80@0.85
No. 1 nut.....	0.70@0.75
No. 2 nut.....	0.60@0.65
Screenings.....	0.40@0.45

<i>Mt. Olive</i>	
6-in. lump.....	\$1.35
3-in. lump.....	1.25
3x6-in. egg.....	1.00
No. 1 nut.....	0.80@0.90
No. 2 nut.....	0.75@0.80
2-in. screenings.....	0.40@0.45

The higher-grade coals from the inner district, such as Trenton, etc., are still holding at from \$1.75 to \$2. The tonnage from the Springfield district has practically ceased, and this is also the case with the Harrisburg and Gallatin Counties. Big Muddy coal is moving slowly at \$2.25 for 6-in. lump and \$2 for 2-in. lump.

There has been a marked decrease in the demand for anthracite, and practically all sizes have been under demurrage at East St. Louis during the past week. One commodity in good demand is coke, especially in the Northwest, and gashouse is bringing \$4.75 at St. Louis, with byproduct at about \$4.90.

Chicago

There is an apparently complete demoralization in the Chicago market, with a slash in prices in almost every direction. A free supply of coal, plenty of cars and little buying are the chief factors contributing to this situation.

The range of prices has been unusual. Smokeless lump and egg, which commanded \$2.25 two weeks ago, is being disposed of at almost the buyer's own price. Starting around \$2, the price vacillated for a time and then tumbled

St. Louis, Mo.

The market is in much the same condition as last week, with the exception that some of the operators are down to where they are selling coal at less than cost of production. Everything took a slump,

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to \$1.90, from where it dropped soon after to \$1.75, and even \$1.60 and \$1.50 in some instances.

Smokeless mine-run, which was firm a short time ago at \$1.10, fell to 90c. and 85c. Hocking coal has felt the effect of the weak market, and went first to \$3 and later to \$2.90. On Franklin County coal the price in Chicago proper has remained around \$1.50 for car-service coal; Carterville also has been weak. Screenings showed greater strength than was expected, the decline being not more than 10 cents.

Prices direct from the mines, in net tons, to retail dealers and steam users on spot shipments are as follows:

	<i>Chicago</i>	<i>F.o.b. Mines</i>
Domestic lump	\$2.35@2.50	\$1.50@1.65
Egg	2.30@2.40	1.45@1.55
Steam lump	2.10	1.25
Screenings	1.37@1.52	0.50@0.65
<i>Springfield</i>		
Domestic lump	2.07@2.22	1.25@1.40
Steam lump	1.97@2.07	1.15@1.25
Mine-run	1.83@1.87	1.00@1.05
Screenings	1.32@1.42	0.50@0.60
<i>Clinton</i>		
Domestic lump	2.12@2.27	1.35@1.50
Steam lump	2.00@2.20	1.25@1.45
Mine-run	1.82@2.02	1.05@1.25
Screenings	1.42@1.52	0.65@0.75
<i>Pocahontas and New River</i>		
Mine-run	\$2.95@3.05	\$0.90@1.00
Lump and egg	3.65@3.90	1.60@1.85

Coke—Coke is quoted at: Connellsville, \$4.50@4.65; Wise County, \$4.50@4.65; byproduct, egg and stove, \$4.95; byproduct, nut, \$4.55@4.65; gashouse, \$4.85.

Spokane, Wash.

The prices at Spokane remain unchanged and are the same quoted for the month past. The general condition at present seems to be most favorable, the weather not being too cold, and the supply is not decreasing as fast as usual at this time of the year. The shipments continue to be good, and the stocks are slowly being replenished.

Portland, Ore.

Portland has been fortunate in the weather line, so far this winter, which is not appreciated by the coal dealer, for certainly it has not stimulated the demand. The thermometer went down to 31 above, some weeks ago, which is by far the coldest since early last spring.

The demand for coal has been light, so the dealers have found no necessity to advance prices and values are exactly where they stood when the winter schedule went into effect in October. No new shipments have arrived from Australia, and none is due to arrive in the immediate future, although a few cargoes are *en route*. The period when fuel is most in demand in this section is during January, February and March, and it is to these months that the coal dealers look with the greatest interest.

Production and Transportation Statistics

HAMPTON ROADS PIERS

Coal handled at Hampton Roads piers to Dec. 9 of the present year was as follows:

Chesapeake & Ohio Ry.	3,345,807
Virginia Ry.	1,908,678
Total	5,254,485

THE CHESAPEAKE & OHIO RY. CO.

The following is a comparative statement of the coal and coke traffic from the New River, Kanawha and Kentucky districts for the months of October, 1910 and 1911, in short tons:

To	COAL	
	1910	1911
Tidewater	335,655	322,779
East	185,168	167,219
West	1,025,887	886,333
Total	1,546,710	1,376,331
Bituminous from connections	19,077	7,735
	3,559	3,145
Grand total	1,569,346	1,387,211
COKE		
Tidewater	1,675	
East	9,855	25,938
West	8,574	7,461
Total	18,429	35,074
From connections	487	2,735
Grand total	18,916	37,809

*Includes subsequently reported quantities.

NORFOLK & WESTERN RY. CO.

The following is a statement of shipments over the Norfolk & Western Ry. during November, 1911:

From	Com- merical Company	Com- pany Mines	W. Va. Mines
Pocahontas field	1,148,135	98,951	1,189,478
Tug River field	141,914	42,320	184,234
Thacker field	160,690	57,058	217,748
Kenova field	70,439	11,587	82,026
Clinch Valley field	96,198	8,023
Total	1,617,376	217,939	1,673,486
Coke shipments from the Pocahontas field			where were 99,339 tons.

Foreign Markets

GREAT BRITAIN

The inquiry is not so active, but this is probably due to the fact that most buyers have completed their arrangements for loading before Christmas. For forward shipment the market displays a

firm tone for all descriptions. Approximate quotations are as follows:

Best Welsh steam coal	\$4.20
Seconds	4.02
Thirds	3.78
Best dry coals	4.02
Best Monmouthshire	3.78
Seconds	3.60
Best Cardiff small steam coal	2.16
Seconds	1.92

The above prices for Cardiff coals are all f.o.b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f.o.b. Newport, both exclusive of wharfage and for cash in 30 days less 2½ per cent. discount.

Exports—Total exports for first 11 months of the current year were 58,805,355 tons, while for the same period last year they were 56,895,997 tons. The total exports of coal, coke and patented fuel for this period of the current year were 61,236,067 tons, and for last year 59,136,779.

RUSSIA

Production in the Donets region for the first 8 months of the present year as compared with the same period last year was as follows in short tons:

	1910	1911
Bituminous	964,000	1,170,000
Anthracite	166,000	193,000

GERMANY

The following is a comparative statement of the fuel production in the German Empire for the first 10 months of 1910 and 1911, together with imports and exports in metric tons:

	GERMAN COAL PRODUCTION					
	Production		Imports		Exports	
	1910	1911	1910	1911	1910	1911
Coal	126,030,092	133,470,434	9,307,424	9,012,286	19,363,915	22,245,553
Lignite	56,284,894	60,292,946	6,139,200	5,813,871	50,112	48,366
Briquets	*16,098,545	*18,047,727	192,332	174,949	1,593,216	2,002,575
Coke	19,393,499	20,818,326	531,859	497,380	3,335,579	3,718,323

*Includes subsequently reported quantities.

SHANGHAI, CHINA

As was only to be expected under the circumstances there has been hardly any business done on this market owing to the revolution and the difficulties which have arisen on account of the inability to complete satisfactory banking and financing arrangements while the uncertainty lasts in the diplomatic situation. Prices have risen sharply in some cases.

AUSTRIA

Coal production in Austria for the first 9 months of the years 1910 and 1911 is as follows:

	1910	1911
Coal	10,323,734	11,008,690
Brown coal	18,398,089	18,710,953
Total mined	28,721,823	29,719,643
Coke	1,486,091	1,543,800
Briquets	244,408	254,882